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 XVIII - December 10th, 2007

Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Commission, MARK E. FESMIRE, Chairman, on Monday, December 10th, 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...)

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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...)

(Continued...)

PUBLIC COMMENTS:

* * *

(Continued...)

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

(Continued...)

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(Continued...)

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

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(Continued...)

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

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(Continued...)

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

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(Continued...)

Tuesday, November 27th, 2007 (Volume XII)
Commission Hearing
CASE NO. 14,015

(Continued...)

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Friday, November 30th, 2007 (Volume XIII)
Commission Hearing
CASE NO. 14,015

(Continued...)

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Monday, December 3rd, 2007 (Volume XIV)
Commission Hearing
CASE NO. 14,015

(Continued...)

PUBLIC COMMENTS:

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Tuesday, December 4th, 2007 (Volume XV)
Commission Hearing
CASE NO. 14,015

(Continued...)

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Thursday, December 6th, 2007 (Volume XVI)
Commission Hearing
CASE NO. 14,015

(Continued...)

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Friday, December 7th, 2007 (Volume XVII)
Commission Hearing
CASE NO. 14,015

(Continued...)

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Monday, December 10th, 2007 (Volume XVIII)
Commission Hearing
CASE NO. 14,015

(Continued...)

PUBLIC COMMENTS:

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Applicant's	Identified	Admitted
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Exhibit 3	2736	-
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Exhibit 15	449	511
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Exhibit 23	842	1159
Exhibit 24	844, 846, 1109, 1156	1159
Exhibit 25	846, 1157	1159
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E X H I B I T S (Continued)

Applicant's (Continued)	Identified	Admitted
Exhibit 27	847, 1158	1159
Exhibit 28	(2551), 2626	2629
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Exhibit 31	(admitted on behalf of OGAP) -	2574
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Rebuttal Exhibit 1	4429	4455
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Rebuttal Exhibit 5	4447	4455
Rebuttal Exhibit 6	4448	4455
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Industry	Identified	Admitted
Exhibit 1	1184, 1212	1216
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Exhibit 3	1213	1216
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(Continued...)

E X H I B I T S (Continued)

Industry (Continued)	Identified	Admitted
Rebuttal Exhibit 5A	3610	3611
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Page 3	3582	3611
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Page 5	3590	3611
Page 6	3601	3611
Rebuttal Exhibit 12	(4560)	4685

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ConocoPhillips	Identified	Admitted
Exhibit 1	4007	4041
Exhibit 2	4011	4041
Exhibit 3	4157	4187
Exhibit 4	4159	4187

* * *

OGAP	Identified	Admitted
Exhibit 1	1417	1417
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(Continued...)

E X H I B I T S (Continued)

NMCCAW	Identified	Admitted
Exhibit 1	1757	1861
Exhibit 2	1758	1861
Exhibit 4	1861	1861
Rebuttal Exhibit 5	4515	-

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IPANM	Identified	Admitted
Exhibit 1	-	-
Exhibit 2	-	-
Exhibit 3	-	-
Exhibit 4	3074	3176
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Exhibit 6	(3065)	-
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Exhibit 8	3161	3176
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Exhibit 18	-	-
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Exhibit 21	-	-
Exhibit 22	2961	3012
Exhibit 23	-	-
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(Continued...)

E X H I B I T S (Continued)

IPANM (Continued)	Identified	Admitted
Exhibit 25	-	-
Exhibit 26	-	-
Exhibit 27	-	-
Exhibit 28	-	-
Exhibit 29	-	-
Exhibit 30	-	-
Exhibit 31	-	-
Exhibit 32	3330	3361
Exhibit 33	-	-
Exhibit 34	-	-
Exhibit 35	-	-
Exhibit 36	-	-
Exhibit 37	23	-
Rebuttal Exhibit A	4470	4471

* * *

Additional submissions by the Division, not offered or admitted:

	Identified
OCD's Requested Changes to 9/21/07 proposal, 11/7/07	558
e-mail from David Brooks to Kelly O'Donnell, 10/22/07	559

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A P P E A R A N C E S

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* * *

ALSO PRESENT:

DONALD A. NEEPER, Phd
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* * *

WHEREUPON, the following proceedings were had at 9:10 a.m.:

CHAIRMAN FESMIRE: Let's go back on the record.

Let the record reflect that this is the continuation of Cause Number 14,015. The date, if my watch is set right, is December 10th, 2007. The time is approximately nine o'clock a.m.

I believe the business before the Commission this morning in this case is the rebuttal testimony of Dr. Stephens and closing arguments; is that correct?

MR. HISER: That is correct, Mr. Chairman.

CHAIRMAN FESMIRE: Mr. Hiser, are you ready to prevent -- "prevent" -- present your witness?

MR. HISER: We are, yes, ready to present our witness, if you'd like to call him.

CHAIRMAN FESMIRE: Dr. Stephens, would you take the stand, please? And you remember that you've been previously sworn in this case, correct?

DR. STEPHENS: Yes, sir.

DANIEL B. STEPHENS, PhD,

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

DIRECT EXAMINATION

BY MR. HISER:

Q. Good morning, Dr. Stephens.

A. Good morning.

Q. Now you were here before the Commission earlier in this proceeding, were you not?

A. Yes, sir.

Q. And you also had an opportunity to review the testimony that's been presented by the Division and by New Mexico Citizens for Clean Air and Water?

A. To some extent, yes.

Q. Okay, the exhibits that they've presented in some of their testimony; is that correct?

A. Yes.

Q. Have you prepared some rebuttal testimony with respect to what you saw in those exhibits and heard in that testimony?

A. Yes, I have.

Q. Would you like to proceed and give us your analysis of what you've seen?

A. Okay. The rebuttal material pertains to three basic elements.

One is the OCD analysis, as I tried to understand it, as it was presented in their materials that were provided to me.

And they my understanding of what some of their critique of my analysis was.

And then last, some comments on work of Dr.

Neeper.

Q. Okay. So why don't we start with your evaluation of the OCD analysis?

A. The summary points about the OCD analysis that I've presented, first of all, it's my view that the OCD analysis is basically unreliable. There's a variety of reasons for that, which I will touch on, but I don't think it should be relied upon in any way.

Q. Another aspect of some work that we've done is that the concentration you would expect in a landfill likely exceeds the concentration by a substantial amount that you would see impacting groundwater from a pit. And I'll show some of that.

Q. Is that true both from a -- on a landfill to an individual pit, but also from a landfill to a large group of pits?

A. That's correct.

CHAIRMAN FESMIRE: Mr. Hiser, before we start why don't we take your exhibit --

MR. HISER: Uh-huh.

CHAIRMAN FESMIRE: -- and number the pages sequentially from the first page?

MR. HISER: That would be fine. So the first page would be number 1, Organization is number 2, Overview would become 3, the title page on Exhibits 20 will be 4,

the maximum impact would be 5, the examples from the OCD Exhibit would be 6, the duration of pulse would be 7 --

CHAIRMAN FESMIRE: Wait a minute -- Okay, NMOCD models -- model outputs, negative concentrations unexplained. That is what page?

MR. HISER: Let's see, I have -- What do you have after this thing that -- or what is your page after, Examples from NMOCD Exhibit 20, p. 105?

CHAIRMAN FESMIRE: Yeah, that's what we were talking about.

MR. HISER: That is page 6, is that what you --

CHAIRMAN FESMIRE: That's page 6.

MR. HISER: Okay, the next one I have is, NMOCD Model Creates Chloride Mass, Duration of pulse is 50 years, in the text.

CHAIRMAN FESMIRE: Okay.

MR. HISER: That would be 7.

Then the next one after that, which is, the model is not mass conservative would be 8.

CHAIRMAN FESMIRE: Okay, that's --

MR. HISER: First bullet point.

CHAIRMAN FESMIRE: -- the first sentence, not the title. Okay.

MR. HISER: Yeah, because sometimes the titles repeat.

CHAIRMAN FESMIRE: Okay.

MR. HISER: And the first sentence of the next is, Dispersivity describes the degree, would be 9.

Then OCD aquifer dispersivities is 10.

The next would be, NMOCD model output shows, which would be 11.

Next is Porosity, which is 12.

Saturated hydraulic conductivity would be 13.

Multiplies soil cover would be 15.

Dulce would be 15.

Dulce map is 16.

San Juan Basin map is 17.

Then the OCD Exhibits 6, 9 and 10 -- I think we're at 18, let me check that. Yes.

Then Assumed (Price Exhibit 9) would be 19.

Assumed leakage would be 20.

Time calculations, 21.

Time calculations number two would be 22.

Impact of landfill is 23.

Landfill is 24.

Setup is 25.

CHAIRMAN FESMIRE: Hang on. Landfill is 24?

MR. HISER: The -- Landfill is 24, yes.

And Setup for both pit and landfill models would be 25.

Then the model with the landfill, multiple pits, would be 26.

Then Impact of landfill would be 27.

Summary would be 28.

Then Part 2. Additional Issues would be 29.

Our Approach is 30.

Then 37 millimeters per year is 31.

MULTIMED is 32.

Rebuttal to NMCCAW is -- now I lost my count.

CHAIRMAN FESMIRE: 33.

MR. HISER: 33.

How realistic is 34.

How realistic number two is 35. I can't turn the page.

The next, root zone -- Thin root is 36.

Water content is 37.

Same water is 38.

Interpretive guidelines is 39.

Natural soil is 40.

Summary is 41. I'm sure everybody is happy we've hit a summary.

And last summary is 42.

And this will take not as much time as the number of slides suggests.

And thank you, Mr. Chairman, that will probably

be helpful.

CHAIRMAN FESMIRE: Continue.

Q. (By Mr. Hiser) Mr. Stephens -- Dr. Stephens, if you'd like to continue, I believe that you were talking about the -- you had reached the "NMOCD Exhibits 20 and 21", which is slide 5.

A. Yes. There's a variety of points that I'll make here, which are related to the opinion that the modeling is unreliable. At best, it's confused or confusing, and unsubstantiated and undocumented. It's not a very transparent analysis to promote a frank scientific exchange of information.

But at any rate what we try to do is to look at the output that's been provided and infer what is done. In some cases it's just a guess as to what was done, and many places we see a lot of inconsistencies, and that's what I'll talk about here.

There's modeling which has been presented that's represented as concentrations in the aquifer, and there are various charts of concentration versus time that are based on data that come out of a model.

For example, here's the output from a model which talks about concentration at the bottom of the vadose zone for run number 1. And what you can see is, for example, the concentration of 6000 milligrams per liter comes out

the bottom of the vadose zone from a simulation in which the input concentration in the waste zone is 100,000 milligrams per liter.

So what I'm looking at in terms of the NMOCD's dilution analysis is that it's the concentration that comes out the bottom of the vadose zone, not in the aquifers. There's no dilution and attenuation happening in the aquifer in their analysis to -- that comes out of the model, that you can -- that we've been provided. That's a little different than the traditional dilution-attenuation factor analysis which has some degree of mixing in the aquifer. The concentrations that we're seeing here are at the bottom of the vadose zone where there has been some dispersion.

Q. Now is this from the HELP model or the MULTIMED model?

A. This is the MULTIMED model.

Q. Okay, so this is from the MULTIMED model output?

A. Right.

Q. Okay.

A. Here's some other model output, and one of the things that hasn't been explained -- this is not data we made up, this is the output files that were provided to us, and when you look through the output files you find in a number of places the predicted concentrations are negative.

We can't find any discussion as to what that means. Physically, you know, it doesn't -- it's impossible.

But numerically what it suggests to me is that the model is unstable, it's a numerical problem, an instability that's triggered when you see concentrations like this.

So this is a red flag to me that there's something really wrong with the model unless they can explain it, and I haven't seen the explanation, but...

I know there was some other discussion about a point we had -- I had made in my earlier testimony, but I wanted to reiterate that it is our view -- in spite of perhaps the agency's views to the contrary, it is our view that when we look at the work that they've done in the MULTIMED model and here's the output, and we look at the duration of a pulse of contamination for 50 years at an infiltration rate of 29.8 millimeters per year and the pore water concentration of 100,000 milligrams per liter, that that translates to a substantial amount of mass.

And in fact, when you do that analysis of how much mass has been flowing from the pit over 50 years, you find out that more mass was moved into the soil than was present in the pit to start with.

Q. And did you make a rough calculation of what the difference in mass might be?

A. We figured about a 40-percent overestimate of the amount of mass in the system, compared to what was in place to start with. So that will exaggerate the impacts to soil and groundwater, in our view.

Q. Okay.

A. And it also -- it's just a physical impossibility to have that kind of situation.

Q. Now I believe that Mr. Hansen said that he thought that -- and I'm not sure whether he was speaking of the HELP model or the MULTIMED model, that it had an algorithm in it that would prevent that.

Did you see as you were going through that output any flags or other things that would indicate that the model would stop to run if it ran out of mass?

A. No, we didn't see anything like that.

Q. Okay, why don't you proceed?

A. One of the important parameters in the OCD's model of migration of fluid through the soil is a parameter called dispersivity, and dispersivity basically accounts for the amount of mixing that the contaminant will experience as it's moving through the system. And from our perspective in MULTIMED, the equation that's in MULTIMED is based on meters, but from what we can tell the dispersivity that OCD used was in feet. And so you'll have this discrepancy of about a threefold difference in terms of the

dispersivity that was assigned to the model.

Q. And what would be the impact of that?

A. Well, if you use -- you know, the greater the dispersivity, the smaller the concentrations; the smaller the dispersivity, the higher the concentrations that would be predicted.

Q. Okay.

A. So they'll exaggerate the impacts to groundwater by using a smaller dispersivity.

Q. Okay.

A. Then in a number of places this dispersivity is assigned a number of minus point -- minus 999. We can't find an explanation for that. I -- Testimony has been relayed to me about what that explanation is, but it just doesn't make any sense to me that the code assigns minus 999, and you don't know what the actual dispersivity is in the model. It's just not appropriate to have unexplained input parameters.

Q. Okay, even though in this case I believe what Mr. Hansen testified was that he was using a derived number that came out of the model itself?

A. Well, that may be, but I don't know what it is.

Q. Okay.

A. It's also my understanding that there was an 8-foot mixing zone now, to be represent- -- that was

represented as what MULTIMED was using.

Every simulation we looked at showed that the output is into a 4-inch mixing zone, or essentially no aquifer at all. It just isn't realistic. It was explained, I believe, in the OCD testimony, that there was a calculation done -- no calculation provided to me, however, no calculation in the model, no mention in the model of 8-foot mixing zone thickness that we've seen, but it was represented that there's an 8-foot mixing zone, but we don't have any support for that.

I'd like to point out that this MULTIMED model -- the manual for the MULTIMED code was never officially by EPA, and the OCD has not provided us with the manual that they're using for whatever version of the code that they've used. So it's not clear to us what this represents.

Q. But in fairness to OCD, that manual may provide some of those calculations that you haven't been able to determine in the absence of that manual?

A. I can't rule that out.

Q. Okay.

A. But we also haven't been provided any of the appropriate input files, calculations, or supporting screen shots that support the 8-foot mixing depth calculation.

Q. Okay.

A. There's a whole host of inconsistencies in model

input parameters. When we go through the various -- the two codes that were used, MULTIMED and HELP -- MULTIMED is the vadose zone model, and HELP is the water balance model of the shallow surface that's used to assign the flux or recharge rate, that becomes input to MULTIMED -- each of these models have parameters that are common, and some of them include porosity, for example. And in one model the MULTIMED porosity is 25 percent, and in HELP it's between 45 and 50 percent.

When we look at the residual water content -- this is the lowest water content the soil can drain to, and in MULTIMED it's assumed to be 11.6 percent. But if the porosity is only 25 percent, in my experience in dealing with unsaturated hydraulic properties -- and we've done this a lot, I've published a lot of research on that -- a residual water content, 11.6 percent, is not matched to a soil that has a porosity of 25 percent, in my view. Likely to be too large.

Q. What's the problem with inconsistent porosities? I mean, in some cases, for example, Commissioner Olson has suggested that, well, we should use the most conservative value at each level, but from a soil science perspective, what issues does that raise in your mind?

A. Well, it's just garbage in, garbage out kind of a concept, really. It's a -- it's not reliable. You just

can't control and do sensitivity analyses when you just -- when you don't have matched parameters.

And as I'll talk about a little later on, there's a lot of areas where there's just a poor understanding of the process. It's maybe in part because there's internally inconsistent hydraulic properties. You just can't randomly assign hydraulic properties and expect to have some good understanding of -- good confidence in your predictions.

Q. So you're saying that as a soil scientist looking -- and a hydrogeologist, looking at how water flows through a soil, that a soil has a certain set of parameters, and while those parameters may vary within a range, there is a limitation on the range that a particular soil can absorb?

A. That's true. And for a particular soil, if you're assuming the soil is a sand or a sandy loam, you don't assign properties that are like a clay, or you assign properties that are like a gravel. It's -- you make an assumption about the soil texture, and you assign the appropriate hydraulic properties that match that soil texture. And then you're consistent. Everywhere you have a sandy loam, or whatever it is, you use the same properties.

Q. And that helps in sensitivity analysis in what way?

A. When you adjust, for example, one parameter by 10

percent, or increase porosity by 10 percent or decrease it by 10 percent, you have a better control and understanding of what the result is when you realize what you're doing is changing that soil, in effect, from a sand to a silt or from a sand to a gravel.

If I increase the MULTIMED porosity by 25 percent, or by 10 percent, I will have increased it to only about 2.5 -- by 2.5 percent, say 27.5 percent. It will still behave pretty much like a -- well, it's very unusual to have porosity that low for almost any soil, it's just not realistic.

Q. Okay. Want to move on?

A. Other inconsistent model parameters include the saturated hydraulic conductivity, often called the permeability.

In MULTIMED, in the vadose zone, the permeability is 2.8 feet per day, and it's .28 feet per day in the aquifer.

In HELP, the soil is .5 feet per day and it's up to 2.0 feet per day in shallow soils.

So there's kind of a tenfold range here, almost, in soil properties for saturated hydraulic conductivity that's -- we just don't understand why, if you're assigning -- assuming the soils are the same texture, you wouldn't assign the same hydraulic conductivity.

Bulk density, input to MULTIMED is 1.83 grams per cubic centimeter. That is at odds with a soil that has a porosity of 25 percent. That should be -- you could calculate, if a soil has a bulk density of 1.83, it should have a porosity of 31 percent. Or if the soil has a porosity of 25 percent, it would have a bulk density of 1.99. Just inconsistent behavior.

There's another parameter that relates to the unsaturated hydraulic properties. These are called van Genuchten parameters. One of them is -- one of the van Genuchten parameters in MULTIMED is given the symbol n, lower-case n, and the value assigned is 1.09, which is typical of a silty clay. On the other hand, the input saturated hydraulic conductivity is 2.8 feet per day, which is typical of a loamy sand, not a clay.

So these are different -- it looks to me like somebody just threw data into the model and didn't understand what they were inputting and --

Q. So once again --

A. -- how it related to the soil properties.

Q. So once again, your concern is that perhaps in an effort to provide what was a reasonable worst-case scenario, they departed from looking at what would ever be an actual soil?

A. Yes, I don't see how you could sort out worst

case from -- when you have parameters that are physically unreasonable and not matched up.

Here's another case of unjustified input that, if you look in the -- in the HELP model there's a soil cover which has a hydraulic conductivity that's assigned to it, and then the soil hydraulic conductivity that's assigned to the models increased by a factor of 2.49. Now I don't know where 2.49 comes from. There's no justification. It might be -- it might be accurate, I have no idea. But why not 2.51 or .24 or -- any number?

Q. Okay, but for -- I mean, it seems to me that on the model here, from what you've put in the little red box, it's an explanation that it comes from root channels?

A. Yes. But again, it may come from root channels, it could come from something else. There's just no explanation why two point -- I'm not aware of a multiplying factor in the scientific literature which says count for roots by multiplying by 2.49 or any other number. It might be out there, I just haven't been provided it and have a basis for 2.49.

Q. And -- But you've done a fair amount of this modeling work and certainly studied the soils in New Mexico, correct? --

A. Yes.

Q. -- and all that. So you're familiar with roots

in the upper part of that soil zone?

A. Yes.

Q. Do they have some impact on that -- on these factors?

A. Yes, they can.

Q. But you're saying that based on what you've seen, you can't say that this factor will be particularly accurate?

A. There's no way to verify its accuracy. But it is significant. I mean, if you increase the permeability of the surface soil you're enhancing infiltration, you're minimizing runoff and increasing infiltration, which will lead to greater deep percolation. But you know --

Q. So that would tend --

A. -- that may happen, it's just not justified.

Q. And so that causes the number -- or the amount of water, and hence the amount of contaminant that that water would be carrying with it to increase --

A. Yes.

Q. -- down into the vadose zone and potentially into the aquifer?

A. That occurs everywhere. I mean, this is just a natural condition in nature. It has nothing, really, to do with the soil cover.

Q. Okay.

A. I mean, when we look at deep soil data, chloride mass balance cores and so on, those are all taking the effects of surface cracks and roots and so on. It's an aggregate that comes out, taking into account all those macropores, heterogeneities, preferential pathways and so on, in many cases --

Q. Okay.

A. -- especially at depth.

Q. Now there's been a lot of discussion in this hearing about Dulce, and you have a couple of comments just about that. I think the first slide just reflects the fact that this is where the Division gathered their precipitation and some other data; is that correct?

A. Yes, and I think there's been quite a bit of discussion about Dulce and its representative rainfall of the San Juan Basin at 17 inches a year.

Q. Okay. And the next slide sort of shows where Dulce is, and I think you've also printed where Farmington is in this map; is that correct?

A. Is this out, this pointer, or -- ?

Q. I don't think it does.

A. Okay. Well, you can see Dulce is in the upper-right quadrant of the slide. And the information on this slide comes from PRISM, it's a publicly available rainfall software tool that every -- almost all USGS studies use

PRISM for mapping out rainfall just about anywhere.

What you can see in the San Juan Basin here between Shiprock and Dulce and I-40 on the south there is that the average rainfall in the San Juan Basin probably ranges from, you know, maybe 7 to, you know, over 15, 16 inches a year, maybe somewhere in there, probably averaging, you know, 10 somewhere in that area.

But there's a lot of data points that are available to find what rainfall patterns there are in the area, Dulce, Farmington, but this is the -- these are precipitation data you can get on line from the Western Regional Climate Center, for instance.

Q. And so if you were -- even if one was looking at, say, a somewhat more conservative number, what could you have done with this greater number of data points?

A. You probably would have come up with an average which is far south of 17 inches a year.

A. And by south do you mean lower?

A. Oh, yes.

So then there's some comments about Exhibits 6, 9 and 10 of OCD. Here, I think, it continues to illustrate -- this segment of slides I'll show continues to illustrate that many of the assumptions that were used in OCD's work are unreasonable, they're mismatched.

Here's, for example -- there was an assumed leak

rate in this Exhibit 9 of -- and that the soil was saturated at -- giving it a hydraulic conductivity of 1 foot per day.

If the soil were saturated and the pit were, in this case, 150 feet by 150 feet by 6 feet, you had this drilling pit of that area, and the saturated hydraulic con-- -- and the soil was saturated and it had a hydraulic conductivity of one foot per day, then you would be putting water in that pit at 116 gallons a minute. And it just doesn't seem like that's a reasonable process, to be flooding that -- I don't know why they would do that.

A continuous -- that's what it would mean if you had saturated soil in that area, you'd be putting in water at 116 gallons a minute, that's how much it could accept over that area. That's just -- just doesn't seem reasonable to me.

Q. Okay.

A. There was an assumed leak rate in another situation of .2 barrels a day, which would be .005 of a gallon a minute, yet the assumption was -- you can see this in the lower left, vadose zone saturated porosity, for example.

This assumption for a 30 -- is just not consistent with saturating a pit 30 feet by 30 feet. That amount of water dripping at .005 of a gallon a minute would

not saturate a pit 90 square feet in area. There's not enough water to saturate the soil.

Q. Now -- or is that leakage from the pit?

A. Well, it's -- the pit is assumed to be having soil underneath that's saturated, and the leakage rate is .2 barrels a day. So I'm not sure if the soils are saturated -- You see the conductivity, it says K_{sat} in the blue box there. K_{sat} is one foot per day, and it says it's saturated.

It's just like -- I'm not sure where these assumptions come from, but they have to be matched to hydraulic properties, moisture content and so on. It's the flux of water that comes out of a pit that controls the degree of saturation of the soils in the pit and below it. And it seems to me an example of some random process that has been chosen for leak rates and soil properties and so on.

Q. Is your basic point that the pit couldn't achieve this level of saturation in the soil underneath it?

A. Yes.

Q. Okay.

A. There were some calculations about the wetting front rate, and this is just -- it's just confusing to me. The water will move through -- if the soil is not saturated, then you wouldn't use the porosity of the soil

to calculate the velocity of water moving through the vadose zone. You would use the water content at whatever was behind the wetting front and the initial water content in any calculations you were using to calculate wetting front or seepage migration.

So it just is not the right approach to calculate wetting front velocity based on porosity, especially if the soils are not fully saturated, which is what I understood was the case here.

Q. Okay.

A. It's a very non- -- it's a nonlinear problem. You need -- it's not such a simple thing to do in a precise way as they're showing here.

Another part of this calculation says it would take six days at 2-percent porosity with a conductivity of 1 foot per day. .2-percent porosity. I'm not sure what that means, that's -- but let's assume it meant 20-percent porosity. That would really be mismatched, .2-percent porosity with 1 foot per day saturated hydraulic conductivity. That just doesn't make sense.

But if you were to put water in at six days at a rate of 4000 barrels a day, you'd have to be putting in 116 gallons a minute, just -- a lot of water. It's just not consistent with the problem.

Q. Okay. Did you look at the question of landfill

versus multiple pits, or what's the cumulative impact of the pits --

A. Yes.

Q. -- and how that might relate to a landfill? Because that's been discussed a fair amount in this hearing off and on. What did you determine as a result of maybe looking at those two types of facilities?

A. We tried to compare the impact of the landfill to multiple pits. The landfill we assumed had an area of 500 acres and had 50 feet of waste in it.

Then we compared that to multiple pits. We assumed there were 50 pits, each having an area 200 feet by 40 feet and spread out every 10 acres, one pit per 10 acres, and the same footprint as the landfill. Within each pit we had 11 feet of waste, and they were lined up to maximize the impact of their collective effects.

For both the landfill and the pit aggregate simulations, we had similar conditions. We assumed the recharge rate was .25 millimeters per year, we assumed that the liners did not leak for the first 270 years, that both were filled with water initially, the bulk -- the chloride concentration initially was 1000 milligrams per kilogram, the aquifer is 50 feet, and the depth to the water from the base of the waste is 50 feet.

So this shows the concept, the landfill and

multiple pits. You can see the pits as they're lined up in the footprint of the landfill, looking at a point in the middle of the downgradient edge of the landfill and the middle of the downgradient edge of the multiple pits.

And what we did was to compare the concentration at each of those two locations. And if you look at the concentration from the landfill, and divide it by the concentration from the pit, you can see a huge effect. Much greater concentration is coming from the landfill. It's a significant difference.

Q. And is there a time difference as well?

A. If you -- the duration of impact from the landfill is substantially longer. It's probably a few hundred years, 200, 300 years, maybe, the peak concentrations that can persist perhaps from the pit simulations, compared to 1000 years or more for the landfill.

Q. And is the pit stuff approximately from this -- in this area here where you see this dip --

A. That's the main impact from the pit, yes.

Q. And that's actually from this group of 50 pits, is it not?

A. Yes.

Q. Now, if we were to -- since obviously, I mean, the post for that is that we're not going to have 500-acre

landfills marching squarely across the surface of New Mexico and all that. What would be the impact of a larger area of dispersed pits, versus a few of these smaller -- big landfills in terms of the groundwater impact? What would you expect to see from a hydrologic perspective?

A. If the pits are not lined up one in a row, they're staggered and spread over larger areas, you'd have a much smaller concentration at the downgradient edge of the pit than what is shown here due to the accumulation of impacts from multiple pits.

Q. Okay. But you would still expect to see a fairly high peak from the landfill wherever the landfill happened to be located?

A. Yes.

Q. Making the assumptions that you did in this modeling?

A. Yes.

Q. Okay. Now if the pits were not all drilled at the same time, but rather a number of them were put in at one phase, and then some years later they came in and some were done at workover, and as you said, they weren't perfectly spatially aligned, what would be the impact of that on the chloride concentration?

A. It would be smaller.

Q. And that's because it's spreading the impact out

now in time, as well as the overlapping peaks may not be as high as they were when you assume that all pits fail at exactly the same day?

A. Yes, sir.

Q. Why don't you summarize your sort of conclusions about the OCD portion --

A. I felt that model was unreliable, in part because the model created mass. There's a number of parameters and assumptions which are inconsistent. Others are unrealistic, like the 4-inch mixing zone, the rainfall that was used in some of the simulations seemed excessive to me. And, related to the landfills, the concentration we would predict under the same conditions of the landfill versus a field of pits is much greater than the pits alone.

Q. Okay. Now there were some additional issues that OCD has raised, in part in their rebuttal testimony, and a couple of their experts, and some of that had to go with the values that you had calculated in your model.

And one of the first things -- and I don't know that it's directly addressed in your slide here -- was the suggestion that you used overly dry pit contents. How did you come up with the water content for the pit contents that you used in your modeling?

A. The pit -- for purposes of modeling, you model the pits as having a mass of chloride, and that chloride is

leached with recharge water.

The initial -- the simulation we did initially, which formed the base case for all of our work, assumed that the pit contents were filled with, it was a fully saturated condition, for purposes of calculating the amount of chloride in the pit materials.

Q. And then when you did your actual modeling, did you decrease that moisture load, or did you --

A. In effect -- in effect, it would be. But you know, when you look at the modeling that's done it basically comes up with a mass concentration that is protective of groundwater. And there's various ways to mix that in the pit contents, but as long as it comes out to be that threshold amount, then it would be protective of groundwater.

Q. I think that there was some confusion about the actual standards that were being recommended based on your modeling work. Would you like to go through what you did on that?

A. There was some discussion about raw waste and treated waste, and the chart here has two groups of columns. One is a column for raw waste and one is a column for treated waste. And then two columns within those. One is the chloride concentration in the raw waste itself, and then there's an SPLP concentration.

The rows represent -- where it says the mixing ratios, the rows represent no mixing, a 1-to-1 mix, a 2-to-1, a 3-to-1, a 4-to-1 mix of waste and clean soil.

When we did the simulation we actually ran the case for where it says no mixing, none (100 percent waste), and for that case it's all raw waste in the pit contents, and there we get 24,800 milligrams per kilogram in the raw waste would be protective of groundwater for the conditions that we assumed. The SPLP concentration corresponding to that is 1240.

Now there's -- one could achieve the same effect if you put higher concentration raw waste in and mixed it with various portions of clean soil. You're going to end up with the treated waste as having the same concentration, 24,800, the same SPLP, but you could achieve those goals in a variety of ways putting in highly concentrated impacted soil and mixing it with greater portions of clean soil. There's just less chloride -- there's the same amount of chloride in the total pit contents, in other words, after mixing.

Q. Is there anything magic about the use of SPLP, or could we use the milligram-per-kilogram numbers equally well?

A. We could use milligrams per kilogram. That would be another standard, instead of doing the SPLP. You could

take a sample of the chloride and -- after mixing, and say it's 24,800, and that would be good enough.

Q. And when you came up with the 24,800, in your professional opinion was that a reasonably conservative estimate of what the likely leaching rates and other things in the soils that we found in New Mexico?

A. Yes.

Q. Now there was a suggestion made, I think, in the rebuttal testimony that perhaps you shouldn't use 37 millimeters per year for the recharge rate for that, and that was based on some material that was published in your textbook --

A. Yes.

Q. -- and -- and all that. Do you have any comments about that use of the 37-millimeter-per-year rate?

A. Yeah, the 37-millimeter-per-year was the upper end of a range of recharge. I had calculated at one location, on the Sevilleta National Wildlife Refuge, actually, where at the time we were collecting measurements, which was in the mid-'80s, that during that period of time -- and it depended on how I calculated the recharge rate, it was based on a geometric mean or an arithmetic mean or a harmonic mean hydraulic conductivity of the unsaturated conductivities. That's what the range represents, for the most part, is just a different

averaging process.

However, the location gives a fairly high recharge rate, largely because of the soil that it's found in, and the sparse vegetation. This is on the flank of a sand dune, and there's very little vegetation surrounding it. So it was an area where you would expect to find very loose sand dune and alluvial material. It would be probably unrepresentative of a well-vegetated surface after -- you know, in a semi-arid climate that was rehabilitated.

Q. And so, based on your experience in having looked at all of these soils and the groundwater characteristics and the unsaturated zone hydrology underneath them, you continue to believe that the number that you were using of about 2.5 millimeters per year is a good, conservative estimate for sort of the broad-scale New Mexico, outside of these concentrated recharge areas where it might be playas or streambeds or things of that nature?

A. It's really not a bad average in vegetated -- in well-vegetated areas.

Q. How long have you been working with unsaturated zone hydrology or vadose zone hydrology in New Mexico?

A. In New Mexico, 27 years.

Q. Okay. And you believe from a modeling perspective the use of an average measured value like that would be better than a derived value from like the HELP

model?

A. I think these numbers are representing very long periods of time, based on field data, in some cases chloride mass balance method. So yes, I think these long-term averages are a reliable way to determine natural recharge fluxes in a variety of soil conditions.

Q. And the last thing, I think, that's been talked about a little bit is a head of water in the pit. And what can we say about that?

A. Neither the work that the OCD has done in its modeling, nor the work that we have presented actually account for the -- any hydraulic head of water in the pits. There's moisture in the pits, but -- and then there's a flux that comes out of the bottom of the pit, but there's no accounting for a pool of water that has hydraulic head on it in either approach.

They're all essentially the same. Both OCD's approach using the HELP model and our approach have a constant flux of water leaving the pit from day one, and that stays constant throughout time, as best I can tell.

Q. So this is something which is done similarly by both sets of modelers?

A. Yes.

Q. Did you have an opportunity to look at the model of work presented by Dr. Neeper in his exhibits?

A. Yes.

Q. And did you have any comments on those?

A. Yes. Dr. Neeper had spent a good bit of time talking about travel time to the water table, and on its own the travel time to the water table isn't really a good indication, necessarily, of impact. It really depends on what's going with it, what kinds of concentrations and so on.

So I think on its own, travel time through the vadose zone isn't necessarily going to give you an indication of impact. It's the concentration and the flow rate together which create the impact. Whether that gets there in one year or 10 years or 100 years isn't so much the issue as to what the spike is, the duration of it and so on. So it's not so much whether it gets there in 10 years or 1000 years, it's the impact as measured in this case by concentration. It wouldn't really depend that much on how fast it gets there in any substantial way, at least not on its own.

Q. Now Dr. Neeper, I think, also talked about three-dimensional dispersion by -- Since we've been talking mostly one-dimensional, for which we, I think, could use a down -- so when we start talking about three-dimension, presumably that now means we're also talking about lateral expansion.

A. Yes.

Q. What would be the impact of lateral -- First of all, did you account for lateral expansion in the modeling that you did, and what would be the impact of lateral expansion on model results?

A. Dr. Neeper raises a valid point. That is that when you have a seepage from a pit and that seepage goes down through the soil, capillary forces will draw that seepage out over a larger area. That's dispersion in a three-dimensional sense. Even though the water's flowing vertically downward, there's a tendency for concentration to move radially outward by a diffusion-type process into unimpacted soils.

And what that does is, it spreads the mass a little bit farther, wider, but it will slow the rate of -- it will spread the area of its impact to groundwater over a larger area, and that will diminish the impact on groundwater when you take this into account.

Our model did not take into account the three-dimensional dispersion. It's not clear to me whether the OCD's model did or not. I suspect it did, but again, I don't have the code, and I can't see the output where it shows that.

Q. But you chose not to include the horizontal or lateral dispersivity in order to come up with a more

conservative estimate?

A. Yes.

Q. Now, in Dr. Neeper's model he showed a top .5 meters or 20 inches that he did not really include in the model, and my understanding from listening to Dr. Neeper's presentation, that he was basing his moisture inputs off of some sort of monitoring gauge, and then the level of moisture that was found starting at a certain depth below surface; is that your understanding as well from --

A. Yes, that's --

Q. -- reading his output?

A. -- that's my understanding, and this sketch -- portion of a sketch from his Exhibit 3 indicates where you can see in the lower left, the white box, it says, Set volumetric moisture here.

And I believe that what he did was assumed something like maybe a 20-percent moisture or maybe some fixed moisture content that would occur 50 centimeters below the surface of the soil. And I believe in any of the modeling work that he would have done, for the most part, setting that moisture content constant at that depth would be inconsistent with a root zone that might extend quite a bit deeper and extract water from depths of maybe three feet or possibly even greater. That is, I think the soil, in my experience, would probably be drier below 5

centimeters than what Dr. Neeper had assumed here.

In other words, he keeps the soil too wet. And when you keep the soil wet -- and as I'll show in a minute, this tends to exaggerate the amount of recharge that's occurring through the soil.

Q. Now a couple questions here. So is your testimony that a root that goes below 50 centimeters would continue to remove water over the depth of the root?

A. It can, yes.

Q. And so that water may be being removed lower than the area that Dr. Neeper had set aside for sort of evapotranspiration cycle at the very top?

A. Yes.

Q. Okay. Now you said that he was holding things constant. Did he really hold things constant, or did he vary that water moisture over the case of years, shown in the second page of your -- or the next page, page 37, of this exhibit?

A. Inferring from the previous cartoon or sketch of his conceptual model, I think he set and prescribed the moisture content at the 50 centimeters depth.

Now again, he may have done something differently. I don't have a report that explains any of this in detail, I don't have the modeling output. I'm sure Dr. Neeper will tell us --

Q. I don't know that Dr. Neeper can, but we can certainly ask the question, say, assuming that he used the volumetric moisture as reflected in this one here, what impact would that have on the statements that you just made?

A. He could -- I'm not sure what Dr. Neeper did exactly, but I'm -- in this whole process, one is having to guess what people do here, and so it's very difficult to do sometimes. You don't want to level criticisms unfairly.

However, from what I hear and understand, I believe this is field data, would show, for example, at 20-inch depth below the land surface, that the water content was about 5 percent through most of the ear, and then it looks like there was a spike to 25 percent moisture content, probably summer thunderstorms, and then the water content declined through the rest of the year in 2006.

Then there's a wet year shown on the bottom slide, which has other water content time series, extends into 2007, and I'm not sure -- it can't be quite right, but in the bottom where it says 2007, to the left you can point to -- you see where there's two arrows at the lower chart, 2007 to the left, 2006 to the right?

Q. Yes.

A. I'm not sure that's the right direction, but -- maybe those arrows are backwards. However, there's a

greater moisture content in the soil during a wet year. And I think what Dr. Neeper did for sensitivity analyses was to look at the average water content and use that to make some assumptions about how water would flow through soil.

Q. Okay, but if we back up to the previous page, which is slide 36 and go now and look at the model and the point that you were making, even if he was varying the end point where he says, Set volumetric moisture here, does that still leave the soil too wet --

A. Yes.

Q. -- it's not including evapotranspiration and the depth greater than 50 centimeters?

A. Yes, he could have -- he could have assigned the exact time series to that location, but it wouldn't tell you anything about what the water content was below that.

Q. Okay. What other evalu- -- what other comments do you have about Dr. Neeper's model on page 38?

A. There were some tests done, or sensitivity analyses that Dr. Neeper did to show, if I remember correctly, infiltration rates in loose soil and in tight soils, and I was trying to figure out how he got those results.

And again, I don't have the scientific documentation to see, it's not transparent to me, but I'm

looking at his two charts here. One, on the left, is the relationship of soil saturation to the soil suction, and the one on the right is the hydraulic conductivity of the soil at various degrees of saturation.

Let's look at the chart on the right.

The sandy loam has a higher hydraulic conductivity here at any degree of saturation in comparison to the sandy clay loam or the clay loam or the clay.

And so what I think Dr. Neeper may have done was assume that the field moisture content of -- let's say it was 20 percent -- existed at the 50-centimeter depth below land surface. And then he changed the hydraulic properties from a sandy loam to maybe a clay and determined how the recharge rate would vary if it was at 20-percent water content but I assume the soil was really a sandy loam, or it was a clay. And I think this chart explains why you would expect to see much lower infiltration rates or percolation rates for a clay, because it has a lower hydraulic conductivity.

The problem is, the moisture content in the soil is uniquely associated with the soil characteristic, the soil texture, and that's what the left-hand chart shows.

There's a relationship between the suction, or how dry the soil is, and the water content. And it's very possible that -- well, back up a little bit.

The way this process works is that a coarse-textured soil may have a very low water content in the field in response to a certain flux of water. If I kept that flux of water the same and just put a different soil in there, the water content -- like a clay, the water content would increase because it has a lower hydraulic conductivity, you need to -- it would be a steeper gradient to get the same amount of water through, the saturation will have to build up.

So it's the flux which is important, not the water content. Once the water content is used as a boundary condition for certain sets of hydraulic properties, then you may get into trouble, because you have to match that field water content up with the exact soil in order to infer what the recharge rate is.

Q. So to go back to sort of our earlier theme, soils have certain properties, and a clay cannot have the water-holding capabilities of a sand?

A. That's basically the same concept.

Q. And so basically what's done is that when Dr. Neeper switched from one type of soil to a different type of soil, he didn't change the other factors to account for the fact it was now a different soil and would have a different water capacity --

A. Right.

Q. -- because he kept going back to that same input from his two models, dry year and a wet year?

A. Right. In other words, if we were to go -- if we were to use this data -- and this might be very good data, I don't know where it comes from precisely, I don't know what the purpose of it was. But if one did know -- if you knew what this soil was -- let's assume it was a sandy clay loam, and this was the water content profile. You have a sandy clay loam.

If you calculate the saturation percentage and compute the hydraulic conductivity from this little chart on the lower right, then that would be the water flux at that depth.

That's how I would have used the time series chart here, to calculate the water flux, assuming this was deep enough where you had a unit hydraulic gradient downward or you knew the hydraulic head gradient from independent measurements.

Q. Okay. Do you have any other comments on Dr. Neeper's model?

A. Getting there. Dr. Neeper had a chart which showed that if you used irrigation water that had a chloride concentration here -- this is the bottom row -- chloride concentration of greater than, say, 300 milligrams per liter, this would lead to potentially some sever

problems for irrigation.

Now I would just point out that there are -- in the -- in natural soils, if you -- this is stuff I presented previously, but throughout the west you find high chloride concentrations in the pore water of soils. In this case up to, you know, several thousand, 9000 milligrams per liter chloride, and these are at depths of maybe 10 feet or more, somewhere in that region, you might find very high concentrations like this, maybe shallower.

But there are desert plants which are thriving in these areas. These are the same desert plants that take the water out of the soil that caused the chloride to increase in the first place. It's a natural process. They're tolerant.

So presumably some of these desert plants could tolerate quite a bit of chloride in the root zone under natural conditions.

Q. And you're talking here in terms of pore water, which would also be in milligrams per liter?

A. Yes.

Q. And that would be, you've seen, into the thousands?

A. Yes.

Q. Okay. Why don't you proceed?

A. Well, just to summarize, the work I'd seen with

Dr. Neeper --

Q. I think you jumped three slides --

A. Did I miss one?

Q. -- was that your intention?

A. Oh, no. I've got this one. Summary of points, yes.

Q. That's the second one. You had a thing showing the natural soil chloride bulge.

A. Oh, I did that one, you weren't looking.

(Laughter)

Q. Oh, well, I'm sorry nobody will object if we don't cover it again, so let's move on.

CHAIRMAN FESMIRE: That's like the pilot opening the door and saying, Does anybody know where we're at?

(Laughter)

Q. (By Mr. Hiser) All right, since counsel was asleep at the switch --

(Laughter)

Q. -- would you cover the summary of points that you have?

A. The summary points. That is, the travel times not necessarily are drivers of impact, and you can have significant impacts from slow travel times and vice-versa.

3-D dispersion, if you take that into account, that will diminish impacts in concentrations that leave the

vadose zone and enter into the groundwater, especially for small sources, relatively narrow sources compared to deep water table conditions, this dispersion effect will be significant.

And I think to the extent Dr. Neeper has, you know, used the water content as I described, I think it's best used to associate that water content with a specific soil under the field conditions to understand what that means about percolation rates. You just can't take the water content and assign any soil to it and assume that's the field recharge rate.

I believe the -- in the conceptualization of models as modeled, Dr. Neeper may have used a root zone which is too thin, and that will overestimate recharge because you don't give the plants enough opportunity to withdraw the moisture over the full depth of their root systems. And we know these desert plants are very effective in extracting water under dry conditions.

And the last point here on this slide is that under natural field conditions, that the salt concentrations that you find in the pore water far exceed some of those irrigation recommendations for chloride.

Q. And yet do we have native plants that grow throughout New Mexico?

A. Yes.

Q. So apparently they are able to tolerate the soil pore concentrations that they're seeing?

A. Yes.

Q. One other question before I turn you over to cross-examination and questions from the Commissioners. There's been a lot of discussion about liners and the impact of a liner on a pit. And for our purposes and in your modeling, you assume that the liner went 270 years and then essentially failed completely and totally and that on that 270th year, everything just started to move down, basically as if there was no liner at all; is that correct?

A. Yes.

Q. And the OCD has suggested in some of their testimony that in fact liners may have one or two small pinpricks in them as a result of installation, and that the number of pinpricks varies, because you may have more if it's poorly done and less if it's well done.

If we were to have some of those pinpricks in a liner, what would be the impact on the modeling simulation that you did, if some of that water or chloride in a pit were to move down earlier than the 270-year catastrophic removal of the liner that you evaluated?

A. Well, you'd be distributing -- you'd be removing mass from the pit sooner, so there'd be less mass there when, let's say, the liner failed completely. But if

you're distributing the mass into the aquifer over a longer period of time, the peak concentrations would be lower.

Q. And so that even if one of these -- if we were to use a level that you've modeled as being protective, the 24,800 or the 1240 or whichever one of those numbers you want to pick, and there was to be an injury to that liner in the installation phase after closure, would you anticipate that would increase or decrease the concentration in the aquifer ultimately, compared to the peak that you would get if the liner just vaporized all at once?

A. I'm sorry, I missed something in your question. Can you repeat it, please?

Q. I'll try. So if we were -- if we took -- assuming a pit that has the concentration of waste in it that you modeled to be protective, assuming the liner went away all at one time -- and that was, as you showed up here, approximately 24,800 milligrams per kilogram of 1240 milligrams per liter; is that correct?

A. Yes.

Q. And what would be the impact if, as a result of the closure activities or, say, seven years after that a midnight dumper comes and decides they want to put something in that pit so they chuck something into it and they puncture the liner -- what would be the impact on the

peak chloride concentration if a hole or a puncture were to occur in that liner?

A. Well, based on the types of modeling that we've done, again, the mass would come out sooner and diminish the peak, more likely than not.

Q. So it would likely diminish the peak, although it may accelerate the time frame in which the impact was seen?

A. That's possible.

Q. And based on your modeling, do you believe that accelerated impact would exceed the Water Quality Control Commission standards, or would it be less than?

A. I haven't done that calculation, but I imagine it would be less.

MR. HISER: I don't have any further questions, Mr. Chairman.

CHAIRMAN FESMIRE: Why don't we go ahead and take a 10-minute break and begin cross-examination at 10:30?

(Thereupon, a recess was taken at 10:19 a.m.)

(The following proceedings had at 10:33 a.m.)

CHAIRMAN FESMIRE: Let's go back on the record. Let the record reflect that this is again, for one of the last times, I hope, a continuation of Case Number 14,015, that all three Commissioners are present, we therefore have a quorum, and we were about to begin the -- not so much cross-examination as partial noncross-examination of Dr.

Stephens.

Mr. Carr, do you have any questions of this witness?

MR. CARR: No, Mr. Chairman, I do not.

CHAIRMAN FESMIRE: Ms. Foster?

MS. FOSTER: No, I do not.

CHAIRMAN FESMIRE: Mr. Jantz?

MR. JANTZ: I do not, Mr. Chairman.

CHAIRMAN FESMIRE: Mr. Huffaker, do you have any?

MR. HUFFAKER: Nothing, Mr. Chairman, thank you.

CHAIRMAN FESMIRE: Okay. I'm assuming, Dr. Neeper, you will. Would you like to go first?

DR. NEEPER: Well, since I'm scrambling papers I'd like to go second if --

CHAIRMAN FESMIRE: Okay. Mr. Brooks, are you prepared?

MR. BROOKS: Probably as prepared as I'm going to get, Mr. Chairman.

CROSS-EXAMINATION

BY MR. BROOKS:

Q. Good morning, Dr. Stephens.

A. Good morning, Mr. Brooks.

Q. Of course, responding to the question just posed by the Chair, you understand that we didn't have any of these materials until this morning, correct?

A. Yes.

Q. So you have had several weeks to develop your criticisms of Mr. Hansen's work, and we have just now had a chance to look at them for the first time.

First of all, I want to ask you some overall questions.

Are these models, the HELP and MULTIMED -- I believe you said in your testimony when you were here several weeks ago that these are not models that you regularly use; is that correct?

A. We have used them. HELP is probably -- maybe more frequently used. MULTIMED, I think we've used it, but I don't believe it's in wide use by us.

Q. How long has it been since you have personally run a simulation on MULTIMED?

A. I don't think I have run a simulation on MULTIMED.

Q. Were we provided modeling codes for the modeling work that you did?

A. I don't know if we -- I don't believe we provided you the code.

Q. Now, I think you confirmed in some of your responsive testimony that your result of 24,800 milligrams per kilogram, which equates to 1240 milligrams per liter by SPLP leachate test, I think you confirmed that that was

your conclusion as to a protective level?

A. Yes.

Q. In other words, according to your modeling, if you started out with that concentration in the waste, the pollutants would reach groundwater in an amount that would approach but would not exceed the WQCC standard of 250 milligrams per liter, making the assumptions that you've made about the background; is that correct?

A. That's correct.

Q. In other words, it does entail the conclusion, and your modeling is not inconsistent with the conclusion that the chlorides in the pit will eventually reach groundwater?

A. That's what the modeling shows.

Q. Okay. And you based your modeling parameters on averages in many instances, at least with regard to the recharge rate? The recharge rate you used was an average?

A. Yes.

Q. If you use an average to determine a protective level, does not that entail the consequence that there will be a lot of individual instances when the standard will be exceeded?

A. Not necessarily?

Q. Why not, if it's --

A. Well, these recharge rates, if what you're

talking about is what might vary from one year to another, and in the real world simulations -- or real world scenarios, you know, the water table is 50, 100 or a couple hundred feet below land surface or more. The physics of a problem is, is that those variations in net infiltration that may occur from year to year will be damped out fairly quickly below the land surface, so that at depth, when you're just above the water table, you're seeing an average condition rather than what happened that year.

Q. But there are going to be differences from place to place as well as from time to time. Otherwise you couldn't criticize our model for using a disproportionately high precipitation rate, correct?

A. Recharge does vary from place to place, that's correct.

Q. Okay, thank you.

Now I think perhaps we need some explanation, and this is really just explanation, because I didn't really understand the graph, the one where you compared the pits and the landfill, and I don't remember what page number it was. Ah, it's 22, I believe -- 27.

You say relative impact. I guess I'm not sure what you mean by that. Could you explain that a little bit?

A. I think if you look at the axis on the side

there, it tells you it's the ratio of the concentration in groundwater adjacent to the landfill, divided by the concentration adjacent to the centerline of the pits.

Q. Okay, very good. Now, you had the output files, Mr. Hansen's output files, prior to your previous testimony, did you not?

A. Prior to my previous testimony? I'm not sure when I got those.

Q. Are you aware that they were produced to the industry committee's counsel a week before the beginning of the hearing, which would have been about two weeks before your previous testimony?

A. That's possible, I just remember exactly when we got the -- you know, the output files.

Q. And when did you first look at the output files?

A. Oh, I've seen portions of them, you know, around the time when we were -- around the time -- over the last couple months or so.

Q. But when did you first study it? I mean, you didn't study it when you first received it?

A. I can't -- I'm not sure how to answer that.

Q. Okay, very good.

You discussed this concept of -- this matter of there being a warning in the MULTIMED model, if you used too much chloride mass, that Mr. Hansen testified that

there was such a warning?

A. I understood that that's what he testified to.

Q. Yeah. Did you -- and you -- did you study the MULTIMED model to determine if that was true or not?

A. We weren't able -- we looked at it, staff looked at it, and we couldn't see where it was.

Q. Now, looking at page 12 of your materials, you criticized the use of a 25-percent porosity. Are you aware -- are you aware that MULTIMED calls for use of effective porosity rather than total porosity?

A. It may.

Q. On the same page, you suggest that 11.6-percent residual water content is too high. What would have been the result -- what -- where does -- which direction does that implicate? If you'd used a lower residual water content, what -- how would that affect the results?

A. The results of what?

Q. The results in terms of chloride concentration in the water?

A. Is this in MULTIMED or is it in HELP?

Q. In MULTIMED. That's what your comment relates to anyway.

A. Yeah, my comment relates to just the mismatch and inconsistencies of numbers associated with specific soils and textures. I'm not sure I can answer the question so

easily.

Q. Okay.

A. Have to do a sensitivity analysis.

Q. Well, basically I was just asking which direction would it -- would it be more conservative or less conservative?

A. I'm not sure I can answer that right --

Q. Okay.

A. -- right now.

Q. Similarly on page 13 about the inputs on the van Genuchten parameters, what would be the effect if you used lower parameters there?

A. I don't know.

Q. Going to your map where you show various places where weather data are available, are you aware of which ones would have had 50 years of consistently reported weather data?

A. No, I'm not sure what the records were from each of the stations that were listed there.

Q. Okay, thank you.

A. You're referring to the map that has the squares on it?

Q. Yeah, I was trying to find that and I'm --

A. Or are you referring to the contour map?

MR. HISER: Page 17.

Q. (By Mr. Brooks) Page 17. But I believe you answered the question.

A. But there were two maps, I just wanted to make sure I understood --

Q. Yeah, that was the one I was referring to, page 17.

MR. HISER: Mr. Chairman, it looks like the witness doesn't have the exhibit. It might be helpful to give him a copy.

CHAIRMAN FESMIRE: Please.

Q. (By Mr. Brooks) Now are you familiar with -- are you aware that there was some testimony about -- some confusion about what size pit would be appropriate for waste in particular types of wells? Did you follow that portion of the testimony? I know you weren't here, but were you briefed on that?

A. No.

Q. If you used a larger pit size, what effect would that have on the results?

A. Generally, you know, larger pits likely have greater impacts.

Q. Thank you.

A. Depends what the geometry is and the groundwater flow, though.

MR. BROOKS: Well, I know you're going to be

surprised at this, but it's been a long trial. I think I'm going to pass the witness.

CHAIRMAN FESMIRE: Dr. Neeper, are you prepared?

DR. NEEPER: Yes, sir.

CHAIRMAN FESMIRE: Why don't you go ahead and question the witness next, please?

DR. NEEPER: I'm as prepared as can be.

CROSS-EXAMINATION

BY DR. NEEPER:

Q. Good morning, Dr. Stephens.

A. Good morning, Dr. Neeper.

Q. I first want to ask you a few questions relevant to the OCD testimony that you were reviewing in your rebuttal. And I may be a little slow, because I have to think back to what you were saying and also refer to your slides as I try to bring these questions together.

You had suggested at one point that a dispersivity three too -- times too large, exaggerates the impact to groundwater; is that correct?

A. Well, I think if you use the dispersivity that's too small, you would -- if you use dispersivity that's small you get a more concentrated impact, if you use a large dispersivity it tends to disperse it over a larger area so the peaks are smaller.

Q. So if you used a larger dispersivity, then you

would wind up with a lower measured concentration, or a lower predicted concentration at any point in the groundwater; isn't that correct?

A. Generally, yes.

Q. So then dispersivity being too large doesn't exaggerate the impact, it minimizes the impact to groundwater; is that not correct?

A. It depends what you mean by impact. If you mean concentration, then large dispersivity will lower the concentration. If you use a large dispersivity it will spread it out over a larger area. So if you're concerned with area as opposed to concentration, you know, they're opposing results.

Q. Yes. Well, if it's spread over a larger area or a greater depth of groundwater, then you would have a lower concentration. For instance, you might not exceed the standard, the predicted exceedence of the standard?

A. That's correct.

Q. I believe your model just used a mixing across about 50 feet of groundwater, and the testimony you reviewed used something like 8 feet; is that correct?

A. That was my understanding of the testimony, I --

Q. All right.

A. But that's one of the contentions that I've raised, is, I just don't have anything other than

testimony.

Q. The 8 feet is a point of contention; isn't that right --

A. That's correct.

Q. -- when you brought it up?

At some point in the printout of Mr. Hansen there was a number which I cannot find this morning, but listed as .1 meter, which I believe was listed as some kind of mixing length in the printout from the code.

Now I'm going to give you a hypothetical case. Let us suppose that that minimally documented code meant to call that .1 meter a dispersivity rather than a mixing length -- it's just that it printed some wrong words in English -- because I'm not sure what a mixing length means.

A. I don't know --

Q. Okay, just follow me, as a hydrologist.

A. So start over again, make sure I'm --

Q. All right.

A. -- I'm on the same wavelength.

Q. On -- at some page during Mr. Hansen's testimony when this 8-foot question came up, I noted that the printout listed a mixing length as .1 meter, and there was feet and meters both on the same page, and that's confusing as you had pointed out.

I want to make a hypothetical case. Suppose that

the author of that code meant to say dispersivity when he said mixing. That's the only supposition I'll make here.

Now I'm going to lead you through a little calculation. I recognize it's difficult to do calculation on the stand, so I'm just going to put it out and say, Does that sound reasonable? because I think it's hard to calculate on the stand.

Let us suppose that I considered an aquifer, as you did, with a velocity of about .1 foot per day; does that sound reasonable?

A. A pore water velocity?

Q. An aquifer that's saturated.

A. Of .1 foot per day? It sounds a little low.

Q. Is that close to what you used?

A. It's possible, but I mean, you know, there are higher numbers.

Q. All right. And I believe in your exhibit you had showed a hypothetical waste unit of something like 240 feet long or so. So then at .1 foot per day, it would take about 2400 days for the water to move from one side to the other of this waste unit, flowing beneath it?

A. Okay.

Q. Okay. Now with that velocity and that dispersivity and that amount of time -- Let me back up to explain. If we multiply dispersivity by velocity, we come

up with a number that looks like a diffusivity -- is that not correct? -- in its units? It adds --

A. If you multiply what?

Q. A velocity by dispersivity. This is how the dispersivity number is used, it's multiplied by a velocity --

A. Right.

Q. -- and then we get a unit that looks like a diffusivity. It enters our equations as a diffusivity --

A. No, no --

Q. -- similar to a diffusivity?

A. -- no, no. No, it's hydrodynamic, it's related to mechanical dispersion coefficient.

Q. Yes. But once we have the -- our mechanism for using it is to multiply that dispersion coefficient by a velocity to come up with a number that looks like or is useful as a diffusivity?

A. No, you don't -- you wouldn't multiply a mechanical dispersion coefficient by velocity. That would give you units of -- length to the fourth power, divided by time.

Q. I can see we're on different units. The dispersivity is usually in units of length, is it not --

A. Yes.

Q. -- meters?

A. Right.

Q. If we multiply by a velocity, meters per day, we would then come up with meters squared per day?

A. Yes.

Q. That is the same units as diffusivity, is it not?

A. What symbol are you using? When you talk about the traditional transport coefficient, are you talking about α times velocity --

Q. Well, α is one of the --

A. -- or the product of the two?

Q. -- van Genuchten parameters, and I --

A. No --

Q. -- I'm trying not to go there.

A. No, no, no, no, no. Now if you had an equation I could -- I think we're just passing in terms of our vocabulary.

Q. We don't have a blackboard, so I may not be able to carry this one out.

I'll tell you again where I'm trying to go, and then you just tell me if where I'm trying to go is reasonable.

I was using the .1 meter number that was printed and labeled as a mixing length, and I'm wondering, what do they mean? I plugged that into the simple formulas I used, I turned the crank, and I came out with about -- by the

time water had moved 240 feet, it would have dispersed whatever contaminant was in it by a distance of about 7 feet, which was very reminiscent of 8 feet.

Does that sound reasonable to you, that perhaps some of the controversy around this 8 feet is the name that the code printed on that number?

A. I don't know, it's possible.

Q. Okay, thank you. Let's get off that, because we can't go any further.

You compared the impact of pits with the impact of a 500-acre landfill. Would not the volume of waste in the pits that you used in that example be much, much less than the waste volume in that landfill?

A. Yes.

Q. And so therefore if we compared them on an equal volume of waste basis, might it not be that the pits could have a considerably larger impact than what you've shown?

A. I don't think so. But you know, it's an analysis that one could do. But generally, the larger the area, again, the greater the impact.

Q. I'll move on to your comments regarding my testimony, and for that I need to get your slides.

You had suggested, if I understood correctly, that to obtain a more realistic estimate one should use infiltration rates rather than a local measurement of the

moisture, of volumetric moisture; is that correct?

A. I think in the context of looking at that moisture content time series, I think my comment there was that I would have wanted to use that data to calculate what the recharge flux might be.

Q. I'll come back to that.

A. I think that was the context.

Q. I want to back up to a question one step above that.

A. Okay.

Q. You assumed a constant infiltration rate, saying this is one way, at least, to estimate impacts?

A. Yes.

Q. But does that not presume that that same infiltration rate moves uniformly downward from above the pit, through the pit, on down through the soil?

A. Yes.

Q. If one doesn't know the infiltration rate, and one wants to be realistic, with what parameter or what measurement would one start?

A. And you wanted to calculate the infiltration rate?

Q. And you want to calculate the motion of the dispersion of the contents of the pit.

A. Well, they're different. I mean, you -- you're

talking about the recharge rate, or you're talking about the dispersion characteristics. They're two different processes. You need two different approaches to quantify those.

Q. Thank you. This suggests that you and I were interested in really two different problems. I was interested, let us say, in the dispersion particularly in the vicinity of the pit, and you were focused on strictly the groundwater; is that not correct?

A. Yes.

Q. When your --

A. We were focused -- let me make clear, I mean, we were -- we did consider one-dimensional mixing. We had a vertical dispersivity in the vadose zone.

Q. Yes. But for example, from calculating as you did with an assumed infiltration rate from the top of the problem, you would not be able to show any upward chloride movement; is that not correct?

A. (Nods)

Q. All motion is downward?

A. In an average sense, yes.

Q. In terms of what the problem, the numerical problem, shows as it runs in the computer --

A. Yes.

Q. -- all motion is downward. It is forced to be

that way; is that correct?

A. Yes.

Q. You had shown a slide that was a reproduction of one of my exhibits, one page of my exhibit, and it showed a plot of moisture and temperature. Can we put that back on the screen? Is that possible?

MR. HISER: Number 37.

DR. NEEPER: It would be page 35 in my book.

MR. HISER: This is the one from Lea County?

DR. NEEPER: It's the one from Lea County.

MR. HISER: That would be Number 37 in yours, I think, and it's -- so it's going to be bigger number --

THE WITNESS: I don't know --

MR. HISER: It's the one with the blue plot I had you look through, Dan.

THE WITNESS: Maybe you can find it for me on your computer here.

MR. HISER: I'll find it.

DR. NEEPER: Would it help if I showed it to you? I can show you --

MR. HISER: I know which one you're talking about.

CHAIRMAN FESMIRE: That's why we numbered them, Doctor.

MR. HISER: This one, Don?

DR. NEEPER: Yes.

THE WITNESS: Thank you.

Q. (By Dr. Neeper) You had stated you weren't sure how I used this data; is that correct?

A. Yes.

Q. Were you present for my oral testimony?

A. I don't believe I heard all of it, no. Maybe one of my colleagues was --

Q. All right. And would it be at variance with anything you have assumed if I suggested the data were used in a time-dependent fashion, that is, moisture was put into the problem as shown changing in time by these data?

A. No, I think that I did say in response to a question that it really wouldn't matter, you'd have to -- in order to calculate a flux, you have to match this water content, whether it's constant or prescribed in a time domain, you have to associate it with the characteristics of the soil and its hydraulic properties.

Q. That's right, and we will go there.

A. Okay.

Q. But you had said you weren't sure even where these data came from; is that right?

A. That's correct.

Q. Does it show on the bottom of the slide where the data came from?

A. It says the Natural Resources Conservation Service, Pedon 2107, Crossroads, New Mexico.

Q. Would not any hydrologist, given that reference, be able to find those data for himself?

A. It's possible, I just don't know that -- I don't have the study.

Q. You had suggested that by virtue of, let's say, inserting this moisture, and even also this temperature, at a 20-inch depth, the calculation, then, did not account for whatever evapotranspiration might occur from deeper pits; is that correct?

A. I'm sorry, can you repeat that, please?

Q. All right. Let us presume that the problem was driven with these moisture data at a depth of 50 centimeters or 20 inches. As I understood you, you said, Well, that might drive some moisture into the problem, but there could be evapotranspiration from a deeper depth, and simply putting in moisture at a higher level would not account for that correctly.

A. Yes.

Q. That would imply, then, that the plant roots are at a deeper depth; is that not correct?

A. Yes.

Q. You have said that you have --

A. Or it could be -- it could be at that depth, and

water is just moving up to, you know, replace the deficit of moisture. That's possible too.

Q. But if water is moving up to replace the deficit of moisture, would that not show in the volumetric moisture as measured?

In other words, if moisture moved from 30 inches up to 20 inches, would we not see that effect? Would that -- would -- or if the 20 inch is drying, would that not pull moisture from the 30-inch depth, therefore forcing the problem to a more realistic condition?

A. Unless you have independent information on the hydraulic head gradient, it's only speculation as to what is happening in the soil moisture regime under these measured conditions. The water is driven by a hydraulic head gradient. It's not driven by gradients of moisture content.

Hydraulic head is what makes this, you know, water move up or down, as you know. So you can't really tell anything about the direction of flow from moisture content at one location. You can't even tell anything about the direction of flow, about moisture content -- from moisture-content data if you had two locations, unless they were in exactly the same soil and had exactly the same hydraulic moisture retention characteristics.

Q. Right, I'll agree with that. So that forces both

of us to run hypothetical problems, does it not? Because we have to specify what are the moisture characteristics of the soil, whatever it may be.

A. Yes.

Q. Our problems are hypothetical?

A. Yes, I would agree with that.

Q. And did I not use at least a realistic starting point by forcing the moisture gradient in the soil to be consistent with the average surface moisture and the depth below that moisture and the properties of the soil as taken from a standard handbook value of soil properties?

A. Can you repeat that for me, please?

Q. It will show up in another one of your slides. Mr. Hiser, I think you had a slide -- a copy of my slide that looked like this?

MR. HISER: It is the one immediately following, Dan.

This one, Don?

DR. NEEPER: That's half of it.

MR. HISER: That's all we had.

DR. NEEPER: We will agree that -- May I approach the witness?

CHAIRMAN FESMIRE: You may, sir.

Q. (By Dr. Neeper) I'll show you a copy of my original page from the exhibit. The top two graphs on that

page correspond to the two graphs you've shown here; is that correct?

A. Yes.

Q. And those simply illustrate the suction and the hydraulic conductivity that one would get if one used the van Genuchten parameters as given; is that not correct?

A. As given where?

Q. As given in my testimony. I did -- if we thumb through there, you'll find a table of van Genuchten properties for a wide variety of soils.

A. Okay, so you selected van Genuchten parameters, and those generated the moisture retention curves shown on here, and it --

Q. You're asking me to fill in your ignorance, if I understand it, of my testimony?

A. Yes.

Q. This makes examination difficult. The bottom graph on that slide, since you ignored it in your criticism, shows the moisture content of the soil under equilibrium conditions, given the driving moisture at the 20-inch depth.

Would that be -- Since one has assumed a uniform soil, would that not be a reasonable starting position for a calculation?

And I probably should have said steady-state

conditions. I can't remember the graph without looking at it. I can rephrase the question --

A. So you're basically -- If I understand what you've done here, is, you've taken -- assumed that the moisture content is 20 percent at the 50-centimeter -- or about 50 centimeters depth, something like that. And then you assume that there were four cases. At 20 percent you'd have to calculate a percent saturation for four different soils, and then you're calculating the equilibrium profile of the moisture content, assuming that at 50 centimeters the water content will be 20 percent for all those four different soils.

Q. You're totally wrong. In order to phrase a question, I will tell you what I did and then ask if what I did is reasonable. That's the best way I know to answer [*sic*] the question. Is that acceptable to counsel?

CHAIRMAN FESMIRE: It's acceptable to --

MR. HISER: Go ahead.

CHAIRMAN FESMIRE: I think that's a proper way to examine an expert. Go ahead, Doctor.

Q. (By Dr. Neeper) Let us presume that I put in, day after day after day, the moisture as measured at this 20-inch depth, as measured by a standard federal agency, and that I did that year after year after year, using the same year, for 100 or 200 or 300 years, whatever it took,

until there was no longer any moisture movement in the problem, and that that problem included an aquifer at whatever depth I said, but in this case was close to 50 feet, one of the cases was close to 100 feet. And then that moisture profile that resulted after a long time, I said, That might be representative of an average moisture profile in the soil; I'll now start my transport problem of chlorides with that. That might be what the soil looked like when the pit was made and abandoned.

Is that a reasonable way to start a numerical investigation?

A. That -- Let me think about that for a second. But your point about this chart specifically says, Saturation and static equilibrium. That means no flow.

Q. That's correct.

A. And so that's how I answered your question. I'm looking at -- and I thought you asked me about --

Q. Ah --

A. -- this chart --

Q. -- let me back up.

A. -- and this is a chart when there's no water flowing at all.

Q. It does not imply no-flow, then in that case we're just disagreeing about static --

A. Static -- static is exactly that, no gradient,

hydrostatic. That's no-flow.

Q. All right, I will state how I used the term. Static means the volumetric moisture at any point in the problem is not changing with time anymore.

A. That's steady-state.

Q. Steady-state.

A. That's different than static.

Q. Yes. If I started the problem from steady-state, would that be reasonable?

A. Yes.

Q. Thank you.

You then brought up the question that one would have to use different volumetric moistures for different soils in order to be realistic; is that correct?

A. Yes.

Q. But not having that and wanting to know what would happen with different soils, would it not be reasonable at least to use what one had and see what happens, particularly if one puts in a different characteristic in the pit than in the surrounding soil?

A. It's fine for sensitivity analysis.

Q. Right.

A. To say that this sensitivity analysis has anything to do -- and the recharge rates that come at the end and talk about -- and I infer, certain millimeters per

year, might have something to do with any of the sites in New Mexico -- I don't think you can take that leap.

Q. Yes. I didn't assert much about recharge rates, but in some cases did I notice that the recharge is infinitesimal or hardly a significant number?

A. I'd have to check, but I think generally you did have quite a range, but it can take -- Can I go through this?

Q. Yes. The point being, is recharge rate the issue here? That's a different problem, is it not?

A. I think recharge rate is an important issue here. I don't see it in here.

Well, yeah, here you're talking about results of the modeling. And I don't know if maybe any of these are relevant, but you're talking about results from the modeling that chloride travels from a pit to groundwater at 52 feet below the waste in 40 years and to groundwater at 101 feet below the waste in 100 years.

What site, what conditions? Is this San Juan Basin? Is this southeast New Mexico? What part of the state? In tight soil -- which soil, where? -- chloride reaches 13 feet below the wastes in 40 years.

The moisture profile is dominated by the long-term average receipt of moisture from the surface.

That's a good point, that's a valid point from

your sensitivity analysis. It isn't generally site-specific.

But when you talk about in loose soil the calculated recharge rate at 67 feet is between 1.4 and 3.5 inches per year, and in tight soils it's less than .05, I'm thinking, well, that may have something to do with conditions at some of these sites. And frankly, I wasn't clear that any of this was purely hypothetical.

Q. It's hypothetical as soon as one assumes a soil, is it not?

A. If you have some soil characteristics to evaluate that time series of moisture content, then it becomes site-specific.

Q. Yes. But you took your soil characteristics from a standard table -- the names of the authors I can't say, but did not your soil characteristics come from a standard reference?

A. Probably Carsel and Parrish.

Q. Carsel and Parrish.

And did I not identify where my soil characteristics came from?

A. I believe you did.

Q. And did I not state in my oral testimony that although I took mine from a standard government publication, the publication related them back to Carsel

and Parrish, and I even went back to the library and checked that the government publication did not err in that?

A. I don't recall.

Q. So both you and I in using Carsel and Parrish numbers are using hypothetical soils; is that not correct?

A. Well, if -- if -- you know, we had data and information on percent sand, silt and clay and pit contents, then that was site-specific or average properties for the pit.

I think the point -- the point here is -- and one of my take-aways from what I've read in your materials that you handed out was that some of these recharge rates are real, and it's driven by -- you know, and what you're saying is that, well, if you have 20-percent water content and you have a sandy soil, you're going to get very high recharge rates.

Fine, but that isn't the kind of condition that we're looking at in the areas that we're -- where these data were collected, for example.

Q. What, then, is the type of soil at that pedon?

A. Pardon me?

Q. You have said that sandy soil is not the type of soil that would be where these data were collected. What *is* the type of soil at that pedon?

A. Oh, I don't have a specific soil texture. I mean, we've assumed a soil texture, much like you did --

Q. But --

A. -- but it's --

Q. -- but you have said this is un- -- this would be realistic only if it were a sandy soil.

A. We prescribe the recharge rate, we prescribe the flux that comes out of many different tests, different soils.

What you're doing is calculating the flux based on water content --

Q. That's correct.

A. -- and they're different.

And what I'm saying is that what I see is, in your analysis you're trying to get a flux, just like OCD used the HELP model to get a flux, we used a lot of chloride, mass balance and other textbook data to get a flux that we felt was reasonable for these areas.

What you're doing is a different approach, and it says that, Okay, we have 20-percent water content. What would be the recharge rates?

Well, at 20-percent water content, if it's a sand we'll get this, if it's 20-percent water and it's a clay we'll get that.

Q. Yes.

A. Well, we'll be all over the map.

Q. That's right.

A. And they are all over the map.

Q. And recharge rates are all over the map, that's right.

A. But that's not the case, what we find when we look at the actual data. It doesn't vary as you have -- as you've shown here.

I think this is a sensitivity analysis, and that's probably as far as I think it should be extended, just a sensitivity analysis, nothing more than that, then --

Q. Is a sensitivity analysis in timing and soil types not in moisture types, because we took only one moisture history -- two moisture histories?

A. Well, I guess I would just make sure that if what you're saying is that the recharge rates that you get from this analysis aren't specific to the San Juan Basin or to the southeast part of the state, then I don't think we have much of an argument on that issue.

Q. All right. What about the upward motion of chlorides? Does this kind of analysis illustrate what can happen in terms of upward transport, whereas if you assume an absolute downward flux of moisture that you have dictated, one can't say anything about that? In fact, one

can't even represent it?

A. Frankly, I didn't look that much at the upward transport issue.

Q. Does one get -- by assuming conditions and constant flux, can one get an idea of what happens when the pit materials are different from the surrounding soil conditions?

A. I suppose so.

DR. NEEPER: Now may I approach the witness again to retrieve my book?

CHAIRMAN FESMIRE: You may, sir.

DR. NEEPER: I need it for about two more questions.

Q. (By Dr. Neeper) In my testimony, I specifically asked the question, How realistic is this model? And I dealt with what would happen in soils of greater suction, and -- soils with greater suction would have shown greater volumetric moisture by a measurement, presumably, than soils with less suction would have less volumetric moisture.

I concluded, Therefore, the model probably has too little moisture in the subsurface profile of moderate and tight soils, leading to an underestimate in that case of chloride transport.

Would that be correct?

A. Can you go back over the part about the suction and the moisture?

Q. I will simply read to you from my slide, if that's acceptable:

> The measured volumetric moisture at a 20-inch depth injects and withdraws moisture. The data from deeper measuring points suggests that the instruments are in loose soil. A tighter soil with greater suction would have shown greater volumetric moisture. Therefore, the problem [*sic*] probably has too little moisture in the subsurface profile of moderate and tight soils, leading to an underestimate of chloride transport.

A. Can I read that -- Do you have something I can read, look at again?

Q. Yes, again I must ask permission --

A. I think what you read was different than what you said --

DR. NEEPER: I must ask permission --

THE WITNESS: -- the first time.

DR. NEEPER: -- to approach the witness.

CHAIRMAN FESMIRE: You may, sir.

DR. NEEPER: Thank you.

COMMISSIONER OLSON: Sorry, Mr. Neeper, what page is that of your -- ? Was that --

THE WITNESS: 44.

COMMISSIONER OLSON: What's that?

THE WITNESS: 44.

COMMISSIONER OLSON: 44.

THE WITNESS: I'm not sure I can agree with this. At least it's ambiguous to me.

Q. (By Dr. Neeper) All right, I won't belabor the point.

In my notion, a so-called tighter soil, more toward the clay end with higher suction, tends to hold the moisture. If you rain on sand, it is soon dry. If rain on clay, at some depth like a 20-inch depth, it may be wet after a while.

And so if we presume that the soil at the measurement point was sandy, then it seems logical that if it were more clayey there, we would have had more moisture at the measuring point. That's what I'm trying to say. Does that sound right?

A. Well, maybe that's -- maybe that's right, but what I'm reading here is not necessarily correct.

Q. Good. Thank you. I think I can leave you with that, without coming back.

You showed one slide that was part of a slide of

mine dealing with interpretive guidelines for irrigation water analysis. This was dealing with the question of SAR in soils, and could soils perhaps be damaged by clay?

And if I understand correctly, your point was that some of the guidelines for irrigation water that are listed as being severe in chloride content at, let us say, 300 parts per million, are much, much less than what one very often finds in the pore water of soil; is that correct?

A. Yes, and native -- some native landscapes.

Q. However, is not the concern with irrigation water that you repeatedly apply it to the soil, and particularly in the southwest the soil dries out leaving the chloride behind, raising the pore water content and therefore is the concern with high chloride in irrigation water?

A. I mean, it is related to the kinds of crops that you're --

Q. Yes.

A. -- that you're growing, and I don't know if it's applied to creosote or some of the four-winged saltbush and other native plants.

Q. I'll agree. This is -- this whole slide was talking about SAR and related subjects.

A. Well, I think this is about -- I thought this was about re-vegetating sites with native desert plants, or --

as opposed to putting alfalfa or something on top of a pit.

Q. You believe that was the context of the slide?

A. I wasn't sure, I mean, I --

Q. You're again showing your ignorance of what the testimony was; is that correct?

A. Well, no, I wanted to make sure that what we were talking about was applications to native desert vegetation. And when you look at the salinity in soils for native desert vegetation with respect to chloride, they already have quite a bit of chloride in them.

So -- and I don't think agricultural soils are going to approach -- even after continued irrigation, they're not going to approach the kinds of salinities that you see in the pore water of some of those chloride bulges.

Q. But your comparison was taken from part of a slide of mine in comparing numbers for irrigation water against pore water and desert soils, and I'm saying you're mixing apples and oranges, there's no relation between these two; is that not correct?

A. It may be that there's no relationship between the two.

Q. Have you ever seen an irrigated field of saltbush?

A. No.

Q. Thank you. A final question considering the

three-dimensional dispersion from a pit.

I had said I ran a one-dimensional problem, suction would tend to pull moisture and also chloride out of the pit horizontally, and I think we both agreed on that.

A. (Nods)

Q. My suggestion was that if the pit material were of a lower hydraulic conductivity or tighter than the soil, then whatever came out sideways would be subject to a faster infiltration than the slower infiltration that could move through the pit material, and therefore it could go down faster. Is that reasonable?

A. Are you assuming there's a cap or some native soil on the cap over the pit?

Q. I assumed that the cap had native soil between its top, which I believe was at one meter or about three feet, and a 20-inch hypothetical top.

A. Well, if what I understand you're saying is that you have a smaller net infiltration on the footprint of the pit than you do outside of the pit, and that's your assumption, as opposed to the same infiltration on the vegetated cover and the native soil outside of it.

Q. In the particular case when the pit is made of a tighter material or a material with lower hydraulic conductivity, yes. Remember, I ran different pit

materials.

A. The flux through the pit is going to be controlled by primarily the flow through the covered material, the vegetative cover.

Not so -- I don't think it should be that sensi- -- as sensitive to the contents of the pit as it is to what the flux is that's coming through the cover, because that will ultimately go through the pit contents, just at a different rate than it would out of -- you know, on the sides, in the native soils.

Q. You're saying that whatever comes through the cover is going to go through the pit?

A. Depending on the thickness of the cover and the vegetative materials, if you had a downward flux of water through the vegetative cover, that's what would go through the pit.

Q. Let me hypothesize a pit that has a lot of clay in it. It rains on the surface, it can settle on the top of that clay, could it not, and return to the surface by evapotranspiration, whereas if I had a sandy pit it would go right on through the pit?

A. It depends on what the fluxes are and the permeability of the clay. I mean, a clay -- you could call a clay something which has 10^{-6} centimeters a second saturated hydraulic conductivity. You could have a clay

liner of an engineered facility which would be spec'd out at 10^{-7} centimeters a second hydraulic conductivity under compacted conditions.

So those are textural characteristics, all of which would probably be relatively permeable to the fluxes of water that would come from below the root zone in the vegetative cover.

Q. I'll simply rephrase the question one more time and then get off it. I'll avoid the word "clay".

If the pit is made of material of a much lower hydraulic conductivity than the surrounding soil, would not the moisture move through the surrounding soil faster than it would move through the pit?

A. Not necessarily.

DR. NEEPER: Not necessarily. Well, calculations, I guess, showed otherwise, so maybe the modeling is at fault there. I should not ask further questions.

May I approach the witness and retrieve my book?

CHAIRMAN FESMIRE: You may, sir.

DR. NEEPER: Thank you.

CHAIRMAN FESMIRE: And that's the end of your questioning?

DR. NEEPER: That's the end of the questioning.

CHAIRMAN FESMIRE: Commissioner Bailey?

EXAMINATION

BY COMMISSIONER BAILEY:

Q. Your comments regarding desert vegetation able to survive with high natural salt concentrations were very generalized and did not specify any particular type of vegetation. Are you seriously suggesting that operators re-vegetate with cholla, manzanita, creosote, vegetation of that type, if that's not representative of the surrounding areas?

A. I really haven't done any specifications of vegetation types as -- My comments were general, not vegetation-specific.

COMMISSIONER OLSON: Good, that's all I have.

CHAIRMAN FESMIRE: Commissioner Olson?

COMMISSIONER OLSON: Just a couple questions.

EXAMINATION

BY COMMISSIONER OLSON:

Q. Dr. Stephens, I guess -- you know, we've been hearing throughout this hearing different testimony from different assumptions of different models, and these models are all based on assumptions. So if certain assumptions are invalid, then the results are invalid, right?

A. The results are different, yeah.

Q. They're different. And I guess -- I think as we've seen here, we have three different types of modeling

scenarios going on, and we're getting three different results. So if I gave this to 10 different modelers I'd probably be getting 10 different results if they weren't communicating with each other?

A. That's possible.

Q. And so I guess wouldn't it be reasonable, then, for the Commission to be conservative in evaluating all of the modeling results that have been presented to us in trying to keep some kind of criteria on it to give us a buffer against the assumptions in the model?

A. To some extent. I understand your point. If you've run the models -- Let's say you have -- you know, you have MULTIMED or you have VADSAT or you have -- FEHM, I think, is what maybe Don used, they generally do the same sorts of things.

But when you have some grossly different input parameters -- I mean precipitation, you know, we could disagree on rainfall.

But if you put hydraulic -- if one model, let's say, has a certain rainfall, but it has hydraulic properties, you assume it's a sand and it has porosity of a sand, permeability of a sand, moisture retention characteristics of a sand, bulk density of a sand, everything looks like a sand -- this model over here which has the capability of doing everything the other model

does, but you input the hydraulic properties of a silt loam or a clay or a sand and you mix them all up, you don't know really what you have, how can you compare the outputs?

You're not just comparing the results of two models, you're -- in one case you have a scrambled eggs -- a real dog's breakfast of information, and the other you have a consistent input data set. I'd dismiss the -- perhaps the differences between the models in favor of the code which was using a consistent set of parameters.

And so I appreciate your point, but I think we need to judge the models on the basis of some of the input consistencies and the reality of some of the assumptions.

Q. But I guess that's what I come back to. All the models are based upon assumptions, and we've heard a lot of requests that things be based upon real-world data, and we do not have a lot of real-world data. We have some data from the Division showing that, you know, in 10 circumstances, I believe it was, that there has been contamination of groundwater. And -- But that's a pretty limited data set, based upon the thousands of pits that have been buried across the state, right?

A. Yes.

Q. So I guess that's -- I guess the point is that we are still looking at assumptions throughout everyone's modeling exercises, and that's something to consider --

that the Commission is going to have to consider, as to what type of, you know, weight to give to those, or to add some type of buffering to try to add the protection necessary for groundwater quality, wouldn't you think?

A. I'm not sure I understand the question specifically.

Q. Well, I guess, I think for example, you know, depth to groundwater is a major criteria that we look at through this. I think it seems -- everybody seems to be in agreement that 50 feet to groundwater is very shallow, but I believe we also have testimony from Dr. Neeper and some other folks that, you know, 50 feet is not really shallow, anything -- you know, 100 feet is really --

A. Yeah.

Q. -- a shallow depth to groundwater. It's the width of my corral, you know --

A. Uh-huh.

Q. -- essentially, and that's also relatively shallow. So wouldn't it behoove the Commission to consider putting some kind of a buffer on these criteria, maybe even in terms of depth to groundwater, to give us an assurance of -- that groundwater quality is going to be protected?

A. With respect to the depth to water, I suppose that wouldn't be unreasonable.

Q. Because I guess that's -- because one thing I was

hearing, I think, from everybody in the modeling is that we all agree -- and correct me if I'm wrong, this is the way I hear it all -- we all agree that it's going to get to groundwater, just a matter of when and in what quantity. That's pretty much what we're -- the major points of the discussion were.

Q. Well, that's true. I think -- well, I don't want to speak for Dr. Neeper, but he has an upward flow component in his analysis, and so -- you know, for the really shallow water table conditions, maybe, in his analysis, that water would flow upward.

Q. Okay. And then -- and I'll try not to get too far into this; we spent a lot of time on this last time -- we come down to the concentrations that you've calculated, and I want to make sure that I'm correct on this again.

Essentially, the key is what the final concentration -- you know, the chloride concentration in the treated waste or the SPLP level of the treated waste, those are the numbers that we need to consider as part of your testimony for what is protective of groundwater quality, correct?

A. That's what I think you should focus on.

Q. Right, so it's either the 24,800 for the soil concentration or the 1240 for the treated wastes, right?

A. Yes, the other's like operational, you know, if

the --

Q. Right.

A. -- got some high salty soil, you could, you know, mix it with -- smaller amounts of that raw waste with larger amounts of clean soil.

Q. And the key, then, is just the final concentration that we're leaving behind, because that may be mixed in all different ways?

A. Yes, finite mass, you know --

Q. Right.

A. -- this volume, and this is -- there's so many kilograms per, you know, kilogram of the mass material that's...

Q. And I think we went over this a lot before, but a lot of this, then, was based upon the 50-foot mixing zone and then the differences that we had discussed, and I think I had asked you about this before.

If we took a 10-foot mixing zone, which is equivalent to what would be monitored for compliance purposes on groundwater quality, looking at the top 10 feet of the aquifer, you said I think in your previous testimony that this is a liner relationship, so if we use that, that would affect your model by -- you know, you take 20 percent of this number or one-fifth of it, and you'd have a number of 260, I guess, correct?

A. Right.

Q. Because the interesting thing I note about that -- were you here for -- yeah, I guess -- I don't know if you were here for the testimony last week of Dr. Thomas, were you?

A. No.

Q. Because Dr. Thomas was stressing to the Commission that we should try to use TCLP -- or I think he'd even acknowledge SPLP might be okay too -- types of analysis so that if the material isn't exceeding -- the SPLP level wasn't exceeding the standard, then there's not going to be a problem from the waste. That's what he was proposing.

The interesting thing, I just -- I don't know if it's really a question or just a comment, and maybe you could comment on it from there yourself, but if I look at using the 10-foot mixing zone, the number from your modeling is about 260 by SPLP, and -- which is pretty comparable to what Dr. Thomas was telling us we should look at as using SPLP or TCLP methods of a 1-to-20 dilution, he would have 240, you'd have 260. Seems to be pretty comparable results from that, from your exercise, as well as just for him -- his generality of using a leaching procedure.

A. I wasn't here for his presentation, but if those

are the numbers, then -- And again, a 10-foot-thick aquifer, I don't know, you know, what -- I guess that's ingrained somewhere in regulatory history, but I'm not sure what all the precedent is for it.

But you'd have to assume that the aquifer and the mixing zone are really 10 feet, and I think I remember testimony from -- I thought it was Mr. Hansen, that indicated that the chlorides, in their experience, tended to sink into the bottoms of the aquifer. And I believe it was a 70-foot-thick aquifer in their model, if I'm not mistaken.

So yeah, it's based on -- this equivalence is based on the assumption that we can get it exactly correct, depending on what mixing zone you actually choose, 10 feet, 20 feet, 25 feet, 50 feet -- aquifers typically are, you know, even greater than 50 feet thick in many areas, so it's -- you know, you're right, you can get an equivalence, but it's based on another assumption, that the aquifer is 10 feet thick.

Q. Well, I think it's really more based upon the idea that -- and I know that the Division has not accepted the large mixing zones in the past; they have accepted -- for some concession they have accepted 10 feet, since that's the area that you're actually measuring as part of your compliance with the standards, because you're

measuring the groundwater, the top 10 feet of the aquifer, and you may also be measuring other portions of the aquifer, because -- I agree with you that in a -- in a high-salt waste you're most likely going to have density gradients at a higher salt concentration at the base of the aquifer, but you don't see uniformity across it from the mixing.

And I know the Environment Department has taken the same approach of -- in those cases, trying to look at a 10-foot mixing zone as analogous to what you would actually measure for compliance purposes.

So if you look at it that way for -- if you have to comply with meeting water quality standards, water quality standards are measured across the top 10 feet of the aquifer if you're doing your first cut for compliance, wouldn't it make sense to use a 10-foot mixing zone to be able to try to match what you're actually measuring in the aquifer?

A. Well, one thing I want to point out is, in the way these plumes behave -- let's say beneath a pit, let's assume that the water and the salt goes down vertically and then hits the water table, and the groundwater is flowing from left to right.

What happens to those plumes is, they don't turn at right angles as soon as they hit the water table unless

there's a really large permeability contrast to refract the stream line, if you will. Generally they'll come down and maybe start to bend and become more horizontal and parallel to the direction of groundwater flow.

So the concern might be that if you have a monitor well that's on the edge of a facility or just downgradient from a facility, that it may in fact even miss the plume. And I would argue that to be safer, monitoring on the edge of a facility would be much better off to be screened across the entire thickness so that you can capture contamination, especially when you suspect it could be dense. I think that's a much safer regulatory approach, personally.

Q. Or you could just have nested monitor wells, to look at the concentrations across the aquifer, to see where you've got the severe problem with the salt. With the high-salt-concentration wastes, you're most likely going to have a higher concentration at the base of the aquifer than you will up at the top?

A. That's a possibility. At that point, then, you will have had a concentration that is some result of mixing through the aquifer.

Q. Right. But it won't be uniform across that 50-foot thickness?

A. No, it may be -- in some cases I've seen almost

clean water at the top and, you know, saltwater at the bottom.

COMMISSIONER OLSON: Well, it's just an observation I had, because if I looked at using the 10-foot mixing zone for your model, you end up with almost the same result that Dr. Thomas is proposing for looking at leachates that meet the WQCC standard, so just observation, I guess.

I think that's all I have.

EXAMINATION

BY CHAIRMAN FESMIRE:

Q. Doctor, could we start with page number 35 in your exhibits? And if I understood correctly, the purpose of this exhibit was to show that when you all did the modeling you didn't include the effects of lateral dispersion, and OCD might have, you weren't sure about that. Is that the correct interpretation of this exhibit?

A. Can you hold it up --

Q. Page 35 --

A. -- Mr. Fesmire?

Q. -- it's titled, Dispersion decreases impact.

A. Okay, that's in Dr. Neeper's presentation?

Q. No, that's in your presentation.

A. But in Dr. Neeper's segment of it?

Q. I thought it was prior to Dr. Neeper's segment --

no, it is Dr. Neeper's segment.

A. Okay, yes.

Q. Okay.

A. Okay.

Q. And you were basically agreeing there that you hadn't included that effect in your modeling?

A. That's correct.

Q. Okay, and that would give a more conservative response than what actually occurs in the model, wouldn't it?

A. Our approach gives a more conservative response. In other words, you could have had higher concentrations in the pit if you considered the three-dimensional dispersion and mixing in the soil.

Q. And -- but I guess where I'm going wrong here is, isn't that the criticism you had of the OCD model, was that it was conservative?

A. We just were pointing out -- I think they used a small -- they used a small dispersivity, I think, is what they used. I think they used feet instead of meters, or something like that. So had they used -- if it was three meters, that would have been a dispersivity of 10 feet, if they used three feet it would have been, you know, this length dispersivity. So the smaller the dispersivity, the higher the concentration at the point of impact.

Q. Okay. But Doctor, that kind of begs the question. I guess what I'm saying is, you used this statement to call attention to the fact that you all had used that conservative assumption in your modeling, yet at the same time you're criticizing OCD's modeling for being conservative, and doing essentially the same thing on a couple of parameters?

A. Well, with respect to dispersion, you know, those are differences in the models and what the models are capable of, not an assumption. I think -- and I'm not sure because I don't know, but I believe they had a two-dimensional dispersion characteristic included in their -- in the MULTIMED model, and ours is just one-dimensional vertical, which I think is more protective.

Q. Okay, but that gets back to the point, that your model would then give a more conservative analysis, wouldn't it?

A. With respect to our model versus their model, perhaps --

Q. Yes.

A. -- and for that parameter it's possible.

Q. Okay.

A. But we don't have that because there's so much -- there's so many other different parameters, it's impossible to compare the two and just isolate the effect. That's one

of the concern, I think, that Mr. Olson was raising, you know, how do you compare these models?

Q. But the point I'm trying to make is, a lot of your criticism of the OCD modeling was based on the fact that they were being too conservative, and yet at the same time, by virtue of the fact that you used this model, you too are introducing a conservative component here that you were criticizing the OCD modelers for doing.

A. This point about 3-D dispersion related to primarily Dr. Neeper's analysis and his statements about, is it real?

Q. Let's look at Exhibit 6 -- page 6 of your exhibit. You made a statement that this is real OCD data from their output sheets, right?

A. Yes.

Q. And you said something kind of interesting: It's not data that we made up. I guess I was concerned what you meant by that?

A. Oh, it was -- it wasn't that this was information I typed or, you know, I prepared in a graphics department; this was pulled out of the output file as it was electronically sent to us.

Q. Transcribed by you all --

A. No, we didn't transcribe it, this is --

Q. -- just pulled it out?

A. -- this is scanned.

Q. Okay. Now, did you provide any input files with the evidence that you filed in preparation for this hearing?

A. In preparation -- I thought we did provide that.

Q. You did provide the input files?

A. I believe we did.

Q. Now on page 14 you made the statement that this -- that the 2.49 in the box at the bottom might be accurate. You're not saying that it's not correct. And I got the idea that it was resident in the model. Where do you think that 2.49 came from?

A. I'm not sure.

Q. Okay. But could it have been resident in the model?

A. It's possible.

Q. Let's look at page 27. Now if I understood your testimony correctly -- and I didn't realize this until it was under cross-examination -- you did not use a comparable waste volume in these pits or a chloride concentration, did you? In the two comparison sets?

A. What page are you on?

Q. 27, the impact of a landfill more than 1000 times the impact of 50 pits.

A. I believe we did have the same concentrations in

there.

Q. What about the same mass?

A. Masses would be different, because the volumes are different.

Q. Okay, how much different are we talking about, masses?

A. The landfill is not quite five times thicker and, you know, much larger in area.

Q. But the per-unit concentrations were the same?

A. Yes.

Q. So the total mass of material in the two analyses would not have been the same, right?

A. No, I think that's the point, I mean, the landfill is going to concentrate and build up and spread over larger areas. And with the pits you have -- you know, they're spread over 10 acres. That's exactly what we're --

Q. So you're not talking about making this comparison for a per unit of volume, per set of volume? You're not talking about 50 pits' worth in the landfill? There's more than 50 pits' worth in the landfill?

A. Yes.

Q. Now, using that as a starting point, if you had to control or remediate the wastes, given -- you know, I'm going to ask you for a hypothetical here, but given that the decision was made that you had to remediate those

wastes or control those wastes, which would be easier, the 50 small pits or the one big landfill?

A. Well, if it's a pit, if there was a problem with a pit, you could fairly easily excavate that, and if it was the landfill, you know, and that has a problem, then you're into extensive groundwater remediation, and that will just -- it's very difficult to repair --

Q. So your --

A. -- a landfill.

Q. So your assumption is that those 50 pits will not need to be remediated?

A. Well, I guess my point is, if there is a problem with the pit, that you could dig it out and do a landfarm or whatever you needed to do, depending on what the constitu- -- concerns were. You just can't relocate a landfill very easily. It's difficult to repair.

Q. Would it be more expensive and more difficult to repair than an equal volume of individual pits -- a number of pits to store -- to dispose of an equal volume as in your hypothetical landfill?

A. I just haven't done the cost analysis. I guess it would depend on how far you had to transport and what your mode of remediation was, whether it was on-site, you know, excavate it out, repair, put it back, what.

Q. Now, on page 31 you were talking about the -- I

guess the recharge rate, and you said that you'd used 2.54 millimeters per year. Is that the correct number?

A. Yes.

Q. Okay, and you said that's probably not a bad average. An average of what? I guess I'm a little confused about where that number came from.

A. Well, we had looked at some measurements of recharge rates that were in the southern part of the state, we looked at some in the northern part of the state, and I think this value that we chose, if I'm not mistaken, was at the higher end of the recharge rates that were found in the San Juan Basin. But it was not unreasonable and not inconsistent with values that were found in some of the southwestern and southern parts of the state, so we had to pick a number to do the analysis.

Q. And -- Pick a number. But in your opinion, picking that number is better than the output from the HELP model, right?

A. They're very similar. You know, the HELP model, I think, came out with two-point-some millimeters per year --

Q. I believe it was 2.3, wasn't it?

A. 2.3 millimeters per year, and we're using about the same thing.

Q. Okay. So for comparison purposes, your eyeball

average and the output of the HELP number -- HELP model came out reasonably similar?

A. Yes.

Q. Okay. Now on page 32 I've got the note here, does not account for hydraulic head. I believe you said that. What effect would leaving the water in the pits for three, six or 12 months have on the analysis?

A. I'm not sure I follow. What -- Can you tell me more about your -- your conditions? Are the pits open, are they closed --

Q. Well, let's start with open pits with a failed liner. What effect would that have on the modeling results?

A. That's just a different -- a different modeling scenario. We --

CHAIRMAN FESMIRE: Time out, just a second.

(Off the record)

Q. (By Chairman Fesmire) Go ahead, I'm sorry, Doctor. I just wanted to see if we could get the building stopped.

A. Can you give me the question again, please?

Q. Okay. If we were to leave the pits open for three months, six months or 12 months, you know, with a breached liner, not necessarily a totally failed liner but a breached liner, what effect would that have on the model?

A. I guess it really depends on a couple of things. One, it would depend on what the moisture content was, it would depend on --

Q. The moisture content in -- the initial moisture content in the vadose zone?

A. Well, that is a part of it, yes. I'm thinking pit materials, pit moisture, is what I was inferring from your question.

The greater the moisture content in the pit, the greater the leakage rate would be initially. As the pit contents dry out, or as they're mixed with, you know, native -- clean native soils, then that moisture content goes down.

So it really just depends on how much moisture is in there and what the actual conditions are, and then what the -- as Dr. Neeper, in this slide that's up here, point out, it depends on what the actual composition texturally of the pit contents is.

Q. Is it possible that we could increase the saturation in the vadose zone and increase the infiltration rate after we remove that material and close the pit, over what it would be if the liner had not failed?

A. I'm not -- I can't understand the question.

Q. Okay. If we have a failed liner or a breached liner -- and the order of magni- -- or I mean the magnitude

of the breach is not material; I'm talking about a hypothetical, where we saturate the vadose zone with the contents of the pit before we dispose of it, before we close the pit --

A. If you saturate --

Q. Or if you --

A. Are you saturating the pit --

Q. -- if you increase the water --

A. -- materials or the soils underneath?

Q. The soils underneath. I'm assuming that the breached liner saturates the soils -- or changes the water content of the soils in the vadose zone.

A. Oh, I see. And what effect does that have on leakage?

Q. What effect does that have on the infiltration rate after the pit's been removed and closed?

A. I would guess fairly small. But if -- if -- here's what I'm -- the way I'm answering the question is that you have a wet vadose zone that's saturated, the water table is down here but you have some wet --

Q. Some degree of saturation.

A. -- and then you have a liner, and the liner now has some holes. At that time there's seepage, leachate or whatever from the pit now going into the soil.

Q. Right.

A. And your question is, if --
Q. We then remove it --
A. -- everything is the same --
Q. -- and close the pit.
A. -- except the soil were now dry underneath there, what would be the difference in the infiltration rate?
Q. You've gotten the question right up to the last part.
A. Okay.
Q. What happens if they remove the material and close the pit at that point, leaving --
A. Oh, remove the material. Is there any mass in the soil to start with? And you're talking about a drainage problem, then?
Q. Yes.
A. Ah, okay, that's -- So all the seepage has occurred prior to the time of the closure, it's closed and then you want to know what the impact is going to be and compare that to the case in which a leach event occurs 270 years into the future?
Q. Right, it --
A. I don't know.
Q. Okay.
A. Let me think. It -- again, it's one of those -- it depends, and you know, Don did a good job on talking

about sensitivity analyses and so on. It's very relevant to this question.

But if the soils are clay and it's saturated, they will drain very, very slowly. And you'd have to compare that drainage case to a situation where there was a clay that was dry and then, as you said, that a leaching event occurred 270 years later.

I guess I would suspect that the -- if you -- Here's the other depends. It depends on how much mass was actually in the soil at the time of closure. If it was chloride from bottom of the pit to the top of the water table and then you do the closure, you're looking at whatever mass is in that soil column, and then how long it takes that mass to drain from the top on down.

So what that mass flux is, what you're trying to compare to the mass flux 270 years in the future at the 24,800 milligram per kilogram times the 2.54-inch -- millimeters per year recharge rate, and I'd have to do the math.

Q. Okay, but it would --

A. It could be more, it could be less. I'm not sure I can answer it off the top of my head.

Q. But the mass would be the same; what we're talking about is fluctuating the rate, right?

A. Well, one thing I can tell you that if the soil

were saturated and you wanted to know what the flow rate of water is across the water table from a condition in which the soil is fully saturated, it's going to be much faster than it would be for the case in which you have 2.54 millimeters per year coming down. The flux initially at time zero is going to be close to the saturated vertical hydraulic conductivity of the soil.

Q. Okay. And the effects that we've seen from drilling pits down in the southeast that were testified to earlier, that's probably what's happened in there then, isn't it?

A. I don't know. I just don't know. It would require, you know, as Commissioner Olson said, looking at site-specific data and evaluating the history of the operation.

Q. Okay. If I promise you it's the last question, could you turn to page 40, the chloride bulges? And I'm assuming that you don't have one of these graphs from the Four Corners area, right?

A. Not plotted here. I don't know of a -- well, you know, there might be some in Bill Stone's work. I didn't look at that, but he has done chloride mass balance methods up in the Four Corners. He would have this, I just don't -- you know, this came from a publication that was in a National Academy of Science monograph.

Q. Okay, but are you trying to make any points about the Four Corners area from any of these calculations -- or these diagrams?

A. This is characteristic of -- I guess, yes, I'd say yes. I mean, it is typical of what you find in the southwest in these climates, and the rainfall regimen in the San Juan Basin is, you know, like many in the southwest.

Q. Okay. So just from an estimate, how close is the nearest one of these soils to Farmington?

A. Oh, to Farmington -- oh, I don't know, a few hundred miles away, several hundred miles, maybe.

CHAIRMAN FESMIRE: Okay. Mr. Hiser, I have no further questions. Do you have a significant redirect?

MR. HISER: I'm not quite sure how to take that, Mr. Chairman.

(Laughter)

CHAIRMAN FESMIRE: Let's make it simple. Before lunch or after?

MR. HISER: Do you want to -- do we need to take public comments? Maybe we should do that.

CHAIRMAN FESMIRE: Yeah, we do need to take public comments.

MR. HISER: Why don't we do that, and then I have very little, but we can do it right after lunch. It won't

take much time.

CHAIRMAN FESMIRE: Okay. At this time we're going to ask, is there anyone in the audience who would like to make a public comment?

Mr. Gallagher.

MR. GALLAGHER: Yes, sir, Mr. Chairman.

CHAIRMAN FESMIRE: We have two ways of doing it, you can either make a statement of position or you can come up here, be sworn and be subject to cross-examination. Which would you like to do?

MR. GALLAGHER: I'd be happy to be sworn in.

CHAIRMAN FESMIRE: Why don't you come forward?

(Thereupon, the witness was sworn.)

CHAIRMAN FESMIRE: Start with your name, please, Mr. Gallagher.

ROBERT M. GALLAGHER,

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

DIRECT TESTIMONY

BY MR. GALLAGHER:

MR. GALLAGHER: Bob Gallagher. Thank you, Mr. Chairman, members of the Commission. My name is Bob Gallagher, I'm the president of the New Mexico Oil and Gas Association. Association represents approximately 335 companies who make up between 95 and 99 percent of all the

oil and gas that's produced in the State of New Mexico.

Mr. Chairman and members of the Commission, it's -- comes as no surprise to the members of the Commission and yourself, Mr. Chairman, that I have been somewhat critical of the process. Somewhat critical may be an understatement.

CHAIRMAN FESMIRE: You mean the circus remark?

THE WITNESS: Well, I thought that the banging on the wall, they may be erecting a tent.

(Laughter)

But I wanted to explain that my comment about having a tent and having a real circus is based on real facts, and I think they're based on four or five things.

First of all, it's based on an October 15th, 2005, op-ed that you had in the *Albuquerque Journal*, Mr. Chairman, that basically elaborated on your thought processes about pits and how water was being contaminated, but yet you sit here as an impartial judge.

It's based on the fact that in the coffee room somebody dreamed up, after the task force, 100 miles to a disposal facility.

It's based on the fact that the rule had to go over to Colorado and suggest that Colorado is going to allow our waste into their state in order to find another disposal facility.

It's based on the fact, as I sit here periodically through this hearing, that I watch employees of the OCD who have testified sit and openly give real-time questions and answers to attorneys from the other side while our -- while our expert witnesses are testifying.

And it's based on the fact that there's hundreds of pits in New Mexico that are lined and that you're going to suggest that they have to take -- to unlined pits.

Now, I -- you know, and then all of a sudden we have circus groupies out front, selling arts and crafts. I'd say we have a real circus.

Our concern would be that the rule is one size fits all. And one size doesn't fit all. When you go to the northwest area and you go to the southeast area you find a big difference. The thought process of doing a risk analysis of depth to groundwater and the amount of chlorides, I believe, is based on science.

We ask that there be a demonstrated need when you consider this rule, that you don't allow unproven reasons, and that you base it on science.

The late Senator from the State of New York used to say, Everybody's entitled to their opinion, but they're not entitled to their own facts.

And I would add to that and say, I don't think you're entitled to your, In my professional judgment, in

lieu of scientific facts. And I think that's what we've heard here.

We look at one part of the rule that calls for a cleanup of 250 milligrams per kilogram of soil under the pit. And yet when we ask we're told, That's not the cleanup, that's just the point that you have to call us.

But yet in the last six weeks in southeastern New Mexico a company has had to clean up five pits, and I've been told that I have exaggerated my comments of $150,000 to $200,000 for cleanup, that in fact it may be less than $50,000. The actual bills that I have here will show you that in the Central Vacuum Unit, which everybody is familiar with in southeastern New Mexico, one pit cleanup within the last two months, $259,000. The second, $242,000. The third, $250,000. The fourth, $230,000. The fifth, $250,000.

Understanding that these are legacy pits, these pits were already cleaned up and closed with the approval of the OCD. But now the OCD is demanding, before this rule is even adopted, much like the op-ed two years ago, of saying 250 milligrams per kilogram is the cleanup level.

We'd suggest 5000 is a good cleanup level. Why do I base that on there? Your rule would allow deep-trench burial with 5000 milligrams per kilogram of chlorides, deeper in the soil than what under the pit would allow.

Again, we don't believe that there's any science. I've heard many times here, and in testimony in front of the Legislature, an unknown company has spent $10 million to clean up a mess in Hobbs. Westgate addition, that's what we keep hearing, and everybody keeps pointing to that as some other reason why we need a new rule.

Let me, if I may, Mr. Chairman, read from the Saturday, this past Saturday, December 8th's *Hobbs News-Sun*: After an hour and a half of deliberation, the 12-member jury found Shell Oil Company was not responsible for any of the medical conditions or property damage claimed by the nine plaintiffs. The jurors were asked to decide if Shell had been negligent in the use of the land. The answer is no. If it had been negligent, resulted in the Plaintiffs' health problems. The answer is no. Did it cause property damage? The answer is no.

The jury was also asked to find if Shell had created a public nuisance due to their operations and cleanup in the neighborhood and if Shell had trespassed on the plaintiffs' property. The answer is no.

The plaintiffs asked for $120 million, and what the plaintiffs got was a big attorney's bill, 12 to nothing, an hour and a half.

I think that what we're talking about is, let's talk about sound science and common sense and not about

unproven reasons and not about in my professional judgment.

Mr. Chairman and members of the Commission, I'll close with the thought process that the oil and gas industry does not care for the environment, for the quality of water or the air that we breathe in New Mexico is a fallacy.

The thought process that some people would bring to this table, that the production of hydrocarbons in this state and the protection of the environment are mutually exclusive, is not true. We have produced oil and gas for 90 years, over 90 years in the State of New Mexico. If we were raping the land, damaging the water, polluting the air, we wouldn't be in business today. But the facts are, we're not.

And the facts are that the present pit rule has done a very good job of protecting the groundwater in the State of New Mexico and protecting the health of the citizens of the State of New Mexico. And I would encourage the Commission to rely on that rule and not rely on a rule that was written based on unproven reasons and not based on sound science, scientific fact.

I appreciate the opportunity to visit with the Commission, Mr. Chairman.

CHAIRMAN FESMIRE: Are there any questions of this witness?

MR. BROOKS: No, your Honor.

MR. JANTZ: None, your Honor.

CHAIRMAN FESMIRE: Commissioner Bailey?

COMMISSIONER BAILEY: None.

CHAIRMAN FESMIRE: Commissioner Olson?

COMMISSIONER OLSON: I just have a question.

EXAMINATION

BY COMMISSIONER OLSON:

Q. You're -- first when you mentioned the Shell Westgate case, you're not saying that there weren't threats to public health at that site, were you?

A. Mr. Chairman, Commissioner Olson, what I'm saying is that the jury found that there was no negligence on the part of the oil company and that their actions did not cause any perceived health problems or risks.

Q. But that's just to the residents that weren't living on top of the pits; isn't that correct?

A. No, sir. One of the -- several of the plaintiffs lived right on top of the pits, and one of the plaintiffs, in fact, had -- their house had to be knocked down.

Q. Actually, several residents have been bought out by Shell, essentially, for their lots, right?

A. I thought that you were referring to the article that I read to -- Yes, several did. But one plaintiff in particular, I think that you had intimated that maybe that

they hadn't lived by the pits or on the pits, but they had in fact.

Q. And one of those had high levels of vapors under the slab. It wasn't part of this suit, so there -- I just wanted to make sure that you weren't saying that there wasn't some type of threat to public health from people that lived over those pits. Shell --

A. Not --

Q. Shell seemed to believe so and bought them out, they reached settlements with them.

A. The jury didn't seem to believe so with these nine plaintiffs.

Q. But most of those plaintiffs didn't live over the pits, most of them lived adjacent to the pits?

A. I don't believe that that's a fair statement, Commissioner.

Q. Okay. And I guess you were mentioning that we -- you should leave the current rule as it is. And I've heard a lot of testimony from industry witnesses talking about we should be using real-world data. But there isn't much real-world data on groundwater conditions around drilling pits, correct?

A. I believe that there's a lot of real-world data on groundwater surrounding drilling pits.

Q. Well, we've only had 10 cases presented to us

here of looking at groundwater conditions around drilling pits, and that was ones that were presented by the Division as having contamination out on a limited set that's been looked at, but I haven't seen any groundwater program that was submitted -- that came here as a part of real-world data from industry.

A. Mr. Commissioner, I think industry stands on its 90-year history. That's probably real-world data.

Q. And if my test- -- testimony that came up from industry members is that nobody's looked at groundwater conditions around drilling pits --

A. I don't -- I was not here for that testimony, but I would suggest that if someone suggested that nobody has looked at groundwater or ground drilling pits, then it's probably not a -- probably totally a factual statement.

Q. Well, I guess just one last question. So if an operator is disposing of wastes with water contaminants, who has the burden of proof to show that it's not a threat to groundwater?

A. Mr. Chairman and Commissioner, that would be outside of my realm of -- or not my expertise, or some would suggest -- someone would suggest I don't have expertise, but I would lack expertise in that area to answer that.

COMMISSIONER OLSON: Okay, that's all I have.

EXAMINATION

BY MR. FESMIRE:

Q. Mr. Gallagher, you said a company has just spent a million dollars or more to clean up five pits in the Central Vacuum Unit?

A. Several of those in the Central Vacuum Unit.

Q. And who was that company?

A. I'm not at liberty to suggest that at this hearing. I think you could ask your own employees, Mr. Chairman.

Q. Okay, why did they clean up the pits?

A. They were told they had to, to a level of 250 milligrams per kilogram.

Q. Do you know who told them that?

A. I do not.

Q. Do you know out of what office that came? Out of the Central Vacuum Unit, it would be out of the Hobbs office, right?

A. I wouldn't know that. I would imagine it's the regulatory authority over oil and gas in the State of New Mexico.

Q. Well, if I'm going to track it down I need to know who did what. So you won't tell me what the company is and you won't tell me who said it, who told them to do it. Can you -- Is there anything else you can tell me

about it?

A. I think you'd have to talk to the people who told them to do it.

Q. Well, Mr. Gallagher, you won't tell me who that is.

A. Well, I don't know who it is, Mr. Chairman. I think you'd have to ask your own employees who it was, because obviously a company didn't spend a million dollars to clean up five pits just because --

Q. Just --

A. -- you know, they had a lot of money before the end of the year to spend.

Q. Just some dude, huh?

A. Yeah, I -- you know --

(Laughter)

A. I don't think that I would call him some dude.

CHAIRMAN FESMIRE: Thank you very much, Mr. Gallagher.

With that, we'll break for lunch and reconvene -- we're going to have a long lunch so that the folks can get ready to do their closing statements, so we'll reconvene at two o'clock.

I'm assuming, Mr. Hiser, you won't take very long in your redirect?

MR. HISER: I have somewhere between three and

five questions.

CHAIRMAN FESMIRE: Okay, we'll see you all back here at two o'clock.

(Thereupon, noon recess was taken at 12:00 noon.)

(The following proceedings had at 2:05 p.m.)

CHAIRMAN FESMIRE: Let's go back on the record.

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

We've reconvened after lunch on Monday, December 10th, 2007.

I believe, Mr. Hiser, you were about to begin your redirect of Dr. Stephens?

MR. HISER: That is correct, Mr. Chairman.

Dr. Stephens, if you could take the chair, please.

CHAIRMAN FESMIRE: And Dr. Stephens, you remember you've been previously sworn in this case.

DR. STEPHENS: Yes, sir.

DANIEL B. STEPHENS (Resumed),

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

REDIRECT EXAMINATION

BY MR. HISER:

Q. Now Dr. Stephens, there was a little bit of

discussion between you and Commissioner Olson that related to depth to groundwater and the benefits of 50-foot versus 100-foot depth to groundwater.

In your opinion, is there any benefit that the Commission would -- any substantial benefit that the Commission would derive from looking at a 100-foot depth to groundwater, as opposed to the 50-foot?

A. I wouldn't think so.

Q. And why is that?

A. I think the depth to -- the depth to water is not a very sensitive parameter in terms of impacts to groundwater. I've worked at sites throughout the country where there are 400-foot and 4-foot and 40-foot depths to water, all of which have contamination, and the approaches that are traditionally taken, most regulatory environments are the same ones that we've applied in which you have a one-dimensional vertical flow of water, beneath it a waste source, be it pit, pond or lagoon, landfill or whatever.

And that one-dimensional flow sustained by a natural flux of water from recharge, for example, will just continue to drive mass downward. It's only a question of time before that mass gets to the water table. And the concentrations that you will see, that you see, in the one-dimensional sense, are the same whether the water table is at 50 feet or at 100 feet. It's only delayed in time.

That's the most conservative perspective. Otherwise, you know, applicants or nonregulatory parties would want mass to be spread out over very large areas, absorbed into the soils and never get to the water table.

So the traditional regulatory approach, in my experience, is to constrain the migration to be one-dimensional downward, and that's the most conservative approach. And in that approach, conceptually, the depth to water table is not a factor.

Q. And you believe, based on the modeling and your general experience in New Mexico and some of the cleanups that you've done, that 50 foot would be a relatively protective level --

A. Yes, I --

Q. -- here for the state?

A. -- I would think so.

MR. HISER: That's all my questions.

CHAIRMAN FESMIRE: Is there any redirect on that subject?

MR. BROOKS: No, your Honor.

MR. JANTZ: No, Mr. Chairman.

CHAIRMAN FESMIRE: Commissioners?

COMMISSIONER BAILEY: No.

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

With that I'm assuming that the industry committee closes?

MR. HISER: We are prepared for closing, Mr. Chairman.

CHAIRMAN FESMIRE: Okay. The way I was planning on doing it was letting the proponent give their closing statement first, then everybody else, and then the proponent have a short time for rebuttal at the end. Is that acceptable to everybody?

MR. HISER: Yes, sir.

CHAIRMAN FESMIRE: Okay. Mr. Brooks, are you ready?

MR. BROOKS: Yes, I believe so. Mr. von Gonten is going to help me with some exhibits.

CHAIRMAN FESMIRE: And while I'm not going to constrain your time, I am going to remind you that you said 30 to 45 minutes, and I'm going to get real --

MR. BROOKS: I'm aware of that --

CHAIRMAN FESMIRE: -- real vigorous --

MR. BROOKS: -- Mr. Chairman --

CHAIRMAN FESMIRE: -- about reminding you towards the end.

MR. BROOKS: -- so I shall be watching the clock.

CHAIRMAN FESMIRE: And Commissioner Bailey reminds me that four o'clock would be a good time to leave

to get home before the roads freeze up.

MR. VON GONTEN: David, do you want 16 first?

MR. BROOKS: I'm not quite ready. I think I'm going to make some introductory remarks, and then I'll --

MR. HISER: Oh, that reminds me --

MR. CARR: Yes, move your ex- --

MR. HISER: -- I need to move my Exhibit, which would be Rebuttal Exhibit 12, which is Dr. Stephens' slides.

CHAIRMAN FESMIRE: Okay. Is there any objection to the admission of Rebuttal Exhibit -- industry committee Rebuttal Exhibit 12?

MR. BROOKS: None, your Honor.

MR. JANTZ: None.

CHAIRMAN FESMIRE: Okay, Rebuttal Exhibit 12 from the industry committee will be admitted, all 42 pages of it.

MR. HISER: Let the record reflect it's shorter than it was.

MR. BROOKS: May it please the Commission?

CHAIRMAN FESMIRE: Mr. Brooks?

MR. BROOKS: As Mr. Gallagher was addressing you before lunch, I pondered somewhat what my role might be, and I'll have to admit that during the course of this proceeding when I have been constrained to cross-examine

witnesses about exhibits that have all kinds of little markings on them that I can't even think of a way to articulate because I don't know the Greek alphabet, I felt like perhaps I'm the trapeze artist. But perhaps in the next 30 to 45 minutes, you will conclude I'm the clown. We shall see.

Honorable Commissioners, it would be presumptuous of me as an attorney to attempt a conventional summation of evidence that is primarily technical and primarily abstruse, from my perspective, in the fields of geology, engineering and hydrology and to argue my conclusions to a geologist, an engineer and a hydrologist. Nevertheless, as a lawyer I do feel that I am obliged to point out some things, a few things, in the evidence that I believe are very telling in this case. And when I have done that, I will comment briefly on some legal considerations that I believe point the direction in which the Commission should go in this matter.

At this point, Mr. von Gonten, if you would be kind enough to bring up Exhibit Number 16, the portion of Exhibit Number 16 which I refer to.

Exhibit Number 16 is the summary of the OCD's results from its examination of pits. And it's a summary that's 40 pages long, but I have brought up for your consideration the part that I think is most pertinent to

your considerations.

If you will go to the next page, Mr. von Gonten, page 34, you will notice in the box that the OCD concluded that eight constituents exceed the NMED soil screening levels, and 25 constituents exceed NMED's soil screening levels for protection for groundwater.

Now, you have heard a great deal of discussion and argument about whether or not pit contents present a hazard to the environment. But it is quite clear from this exhibit that the OCD's -- that the OCD has established through its sampling program that pit contents, randomly selected and brought to your attention from sources not picked for their particular environmental sins do exceed established standards in terms of the existence of several recognized pollutants.

Well, Dr. Thomas the other day attempted to trivialize this proceeding by saying it was about nothing but the odor and taste of water. Let us assume that Dr. Thomas is correct. The odor and taste of water are things that people that live in the country are very concerned about, as I am very well of from a particular experience which I won't recite because I'm not here to tell war stories, but voir-dire'ing a jury when I was defending an oil company in a saltwater-pollution case, and I heard some interesting stories on the subject of odor and taste of

groundwater.

It is a valid concern. Aesthetics is part of the environment. There does not have to be -- there do not have to be any dead bodies for this Commission to be concerned.

But even if we needed to bring our concern to a higher level, our evidence has done so.

If you would go back to the immediately preceding slide, please, Mr. von Gonten.

If you look at a level that is not in red there, the chloride level -- it is one, two, three, four, five -- sixth line down under 23, general chemistry analytes. You will note that in southeastern New Mexico the pit sampling detected concentrations in the waste as high as 226,000 parts per million, or almost 25-percent salt. And the industry committee's sampling detected concentrations as high as 420,000, or above 40-percent salt.

Now the difference between these two probably doesn't make a great deal of difference, because it's my understanding that the solubility limits of sodium chloride and water come into play somewhere in between those numbers.

But we are not talking small numbers. We are talking numbers that, even allowing for stabilization, and even allowing for attenuation during the migration to

groundwater, are going to result -- or could result, could well result in chloride concentrations in groundwater in the range of 5000 to 10,000 parts per million, or even more, which could make the groundwater source unusable for a great many purposes, I would say for many if not most purposes.

What I'm saying is, I'm not going to tell you what the specific risks are -- I'm not a toxicologist like Dr. Thomas -- but I'm going to tell you that they're not minimal, that they are not trivial, and this Commission should not treat this proceeding as if it were trivial, and I know you will not.

Now I want to say something about what we have shown is protective. I want to talk briefly about protective level. Now that is kind of a term that I think I coined, along with the able assistance of Mr. Hansen during his rebuttal the other day, but we were attempting to interpret Dr. Stephens's work.

Well, it interests me that Dr. Stephens furnished us with a new exhibit this morning. There's a lot of stuff in this new exhibit, but I want to call your attention to a page -- and I have before me Chief Price's set, not my own on which I marked page numbers, and this is not numbered, but this is the page that says that, Our approach deals with treated waste.

CHAIRMAN FESMIRE: It's page 30.

MR. BROOKS: Page 30.

Honorable Commissioners, unless I'm missing something, Dr. Stephens has now told us by his chart on page 30 that Mr. Hansen was absolutely right about what Dr. Stephens was saying, that if you measure chloride concentrations by taking an SPLP test, leachate test, from treated waste -- that is, from stabilized waste -- that the appropriate level is 1240 milligrams per liter and not 3500. And that is my understanding of that exhibit, that regardless of the level of stabilization, 1240 is what we need to be looking at.

If we accept Dr. Stephens's work. But we do not accept Dr. Stephens's work. We're relying on the expertise of Mr. Hansen.

And you know, models are not precision tools. I don't know much about them. Mr. Hansen, Dr. Stephens, Commissioner Olson, they work with these things, Chief Price, work with these things day in and day out. They know all there is to be known about these things.

But what I gather from their testimony, and from talking and working with modelers in the course of my work with the Division, is that modeling is not a precise science. It has wide variations in results. And to get a clear picture, you have to look at what different people

come up with, with different credible assumptions.

So let us look at where we would be with protective level if we relied on Mr. Hansen rather than Dr. Stephens.

If you would bring up, please, Exhibit Number 21.

Ed Hansen did a series of graphs tracing his results from his model. And what he was attempting to do was show time, and that's why these are graphed chloride concentration versus time.

But if you compare Mr. Hansen's graphs one with another, I think you will see a picture of where the protective level, assuming a good liner, would be if Mr. Hansen's work is to be accepted.

You will note on this first graph that he has a vertical -- a horizontal line, a bold horizontal pink line -- it's pink on this copy -- that represents the groundwater standard. And you will note that under his modeling, the pollution peaks -- and this is a line- -- this is an arithmetic graph, not a logarithmic graph. I always get confused a bit when you use logarithmic graphs, because lawyers don't understand them, but this is an arithmetic graph. And you will note that with a good liner there is a peak somewhere around 500 milligrams per kilogram on that graph.

Now if you'll go to the next graph, please.

You remember the last graph was at 10,000, and this graph you can see a little more clearly that that peak is going to come in somewhere around -- it looks like about 3000 milligrams per kilogram, the peak of the green line.

Go back to the last graph, if you would be so kind.

And the last graph -- I was probably being a little stingy in saying 500. It looks more like 600 or 700 maybe.

Now, if you would go on to the -- and then go on to the next graph.

If you look at this graph of 100,000, you will see the shape is -- or the relative position of the graph on the chart is almost the same as on the 10,000, but the numbers on the Y axis are 10 times as big.

What I'm suggesting is that this peak traces more or less a linear function. And it's going to come in somewhere around -- your peak is going to come in somewhere around -- if you go back -- if you trace it back to the level where the peak will hit the pink line, it's going to be somewhere around 200 to 300 milligrams per kilogram, rather than -- I'm sorry, somewhere around 3000 to 5000 milligrams per kilogram, which reduced to a 20-to-1-dilution leachate test is going to be in the range of 200, 250 milligrams per kilogram, and not 1240 as Dr. Stephens'

results would suggest.

Now I bring this up partly to show that there's a great variance in the modeling, which your Honors, with your much greater expertise than I will ever acquire about these matters, can evaluate.

But I want to point out another thing which is very significant, in my judgment, in evaluating these results.

The biggest difference -- First of all, there's a big difference in the mixing zone, and I think Commissioner Olson's questions suggested that perhaps if you use a mixing zone -- to the extent I understood them, which I really didn't, but it seemed to me to suggest that perhaps if you use a mixing zone similar to what Mr. Hansen's model used, rather than what Dr. Stephens used, that the results are much closer to coordinate than you might think.

But a big difference was the use of the infiltration rate, and that was debated and debated and debated throughout this proceeding. But one difference that's not subject to debate is that Dr. Stephens based his modeling on an average, and Mr. Hansen based his modeling of the infiltration rate on weather data which was selected to be a conservative worst-case scenario.

Now if you use an average for purposes of regulation, if your object is to pollute up to the standard

-- and I'll say more about that, because the whole idea of a protective level is, you have pollution up to the standard. As long as you don't get above 250 milligrams per kilogram chloride in your groundwater, it's okay.

Even if you're doing this pollute-up-to-the-standard approach, and you base your computations of what will pollute up to the standard on an average, then it seems to me that about half the time you're going to be polluting above the standard. And Dr. Stephens said -- if you recall what he said this morning, he said, Well, the infiltration rate doesn't vary all that much. How much it will -- over time, how much it will vary over the next 1000 years, or how we will know how much it will vary over the next 1000 years I will leave to you all to speculate about.

But he conceded that it could very over place. And the chart which Dr. Stephens put in evidence -- if you can find it, Chief Price -- no, the one with the map, with the climate contours lines on it -- that shows that there are substantial, very substantial differences in precipitation across the San Juan Basin --

CHAIRMAN FESMIRE: That's 16, Mr. Brooks.

MR. BROOKS: -- and it is quite reasonable to assume that those differences in precipitation equate to differences in infiltration rate, from one side of the San Juan Basin at around 20 inches per year to the -- way off

on the reservation at around 6 or 7 inches per year.

Well, I will concede Dr. Stephens used his average correctly in the case of San Juan Basin.

In the case of the Permian Basin, however, Dr. Stephens fudged it a bit, in my opinion, because his slide, number 14 in Exhibit Number 2 that was introduced in his original testimony, shows two instances of studies involving the Ogallala aquifer. And the Ogallala aquifer is not a trivial, unimportant thing in New Mexico.

His studies for the Ogallala aquifer that he quoted, one gave a range of 3.2 -- a recharge rate from 3.2 to 16.9. The other one gave a range of 9.6. And those are the two in New Mexico. There's a third one but it's in Texas, and we don't know exactly where in Texas.

Those two -- Now I'll be fair to Dr. Stephens. He explained that those studies were an average over the aquifer and that they included areas in which pits would not be allowed under our rules, in which the recharge rate would be higher.

But that, in my opinion, does not justify Dr. Stephens' use for the Permian Basin of a recharge rate lower than the lowest of the lower two studies that he cites. In other words, he says study one, 3.2 to 16.9. Study two gives one figure of 9.6, and Dr. Stephens uses 2.5.

Okay, back to what I said about averages. The use of an average in a rule designed to regulate on the basis of a protective level necessarily means that there will be some pollution allowed under the rule, some pollution in excess of standards.

So let's talk about pollution in excess of standards, versus prevention -- pollution prevention.

Now I think you all know what my feeling is about the Water Quality Act and its applicability to the OCD, which is that I believe that it's not, except when we're regulating under it for downstream facilities only.

But the Water Quality Act nevertheless evidences the Legislature's, which is in accordance with the US Congress's, policy perspective on pollution, and it is not one that new sources should be allowed to pollute existing resources up to standard. The Water Quality Act specifically provides that in permitting new sources, the Water Quality Control Commission will, if feasible, establish a no-new-discharge standard.

If we were to set our sights not at a protective level that would permit water to be polluted up to 250 milligrams per kilogram, but rather at a level which would prevent future pollution from oil and gas sources -- and remember, if the oil and gas industry is allowed to pollute up to standards why can't the dairy industry come in and

also request to pollute up to standards, and whatever industries there are in southeastern and northwestern New Mexico come in and say they get to pollute up to standards?

Well, anyway, that aside, we would be looking at even lower numbers than Dr. Stephens's 1240 milligrams per kilogram SPLP or what you -- the much lower numbers that you would derive from Mr. Hansen.

Now there's an anomaly here that you all may be wondering about, and that is, why are we arguing about this when the Division has said that we will accept a treatment standard of 5000 parts per million by SPLP test? And industry comes in and says, Oh, but we want a lower standard, we want 3500. Sounds like there's some kind of a disconnect here.

Well, the disconnect is -- and it should be quite obvious -- that this is a standard for deep-trench burial, which basically the rule that we're proposing does not permit. It only permits it if it's outside of the 100-mile radius, and most of the production activity in this state will be within the 100-mile radius.

The Division would not recommend, does not recommend, that the Commission adopt a 5000-parts-per-million leachate standard -- chloride -- SPLP leachate standard for deep-trench burial, if the Commission were to decide to adopt deep-trench burial as the rule, rather than

the rather unusual exception. And we suggest that if that were to happen, then the Commission should adopt not more than -- certainly not more than the 1240 milligrams per kilogram that emerges from Dr. Stephens's work, and almost certainly very considerably less than that.

Now let me talk a little bit about what is at issue here in this case, because I think there's one issue that overrides all others.

We've had a few collateral issues. They like 12-mil liners, we like 20-mil liners. Not surprisingly, the people who sell 12-mil liners like them, the people who sell 20-mil liners like 20-mil liners.

Mr. Chavez's presentation gives you the evidence that's available from the literature about the relative strength of those liners, but I would point out just that our experience from the districts has shown that there have been a lot of liner problems, that the liners are not holding up, and that suggests to an old country lawyer like me, maybe we need a tougher liner.

But I don't think we would have been here for five weeks over 12-mil and 20-mil liners. And I don't think we would have been here for five weeks over the 250-milligram-per-kilogram delineation standard that Mr. Price testified about, although that's also at issue. But the interesting thing, there's no rebuttal evidence, there is

no contrary evidence to -- nobody contradicted what Mr. Price said about the need for that standard or about the reasons why he explained why he did it. In fact, the only industry expert who touched on it -- and I forget, frankly, whether it was Dr. Buchanan or Dr. Stephens, it's been so long ago, but the only industry witness who commented on it said, yeah, that's in accordance with his view of how chlorides move, that you would find that undulating profile that Mr. Price testified to.

And you know, there's not a whole lot of other things that there are real big issues about. An issue about landowner control -- about landowner consent, and I prepared a brief, as did the other counsel, and I really haven't had the opportunity since that time, because we've been in session all the time, to study the others' brief. If I find anything that requires a reply, I will petition -- specifically petition the Commission to allow replies. But so far, I haven't encountered anything of that character.

I rest on what I said in my brief, that it's not the Commission's function to decide whether the landowners have the right to require their land to be restored to its original condition. The Legislature made that decision last spring when it enacted the Surface Owner Protection Act, and the purpose of our making that requirement is to

force those controversies to the courts where they belong, and not to the OCD where people like to litigate title issues, as your Honors are very well aware, because it's faster and cheaper than the court system.

Those things aside, there's not a whole lot of controversy except dig-and-haul. You remember the 50 feet to groundwater? Mr. Byrom testified that was consensus. Consensus, of course, to the task force doesn't mean all of industry, but the industry committee is not opposing it.

Lined pits, requiring all pits to be lined, industry committee is not opposing it. I'm not sure what IPANM's position is. Some of their witnesses testified that they preferred unlined pits, but they didn't -- there's really no technical testimony to support that position.

So we're basically here about dig-and-haul.

Well, what has the Division shown in support of dig-and-haul?

We have shown that these pits are going to contaminate groundwater. Dr. Stephens admits that they are going to contaminate groundwater, not just when it's shallow but when it's deep, it's just a question of time.

Well, what the industry witnesses are saying, they're saying, Oh, but pits will contaminate groundwater less than a failed landfill.

Well, that may be true, it may not be. We don't know.

But the question is, when you're talking about risk, you have to think about what you're going to do next if you guess things wrong.

And I don't know what's going to happen, I don't have a very good crystal ball. But we have some testimony on the subject, and I really don't think that testimony -- now this is from Mr. von Gonten, and I really wouldn't have put Mr. von Gonten on rebuttal if I'd just had to convince the Commissioners, because I think you understand -- I think your Honors understand this, but I wasn't sure that a district judge would if you decide with us and we had to support it, so I wanted to be sure that we had an expert witness, a credentialed expert witness, who would testify to this in the record.

Now Mr. von Gonten has testified based on his expertise in conducting remediations and his review of the literature that it is his experience, and it is generally accepted in the discipline, i.e., sound science, that waste should be concentrated so you can watch it.

And that makes sense, because if you have 2000 pits that are polluted and -- just a minute, I have to make one digression.

We haven't had all these problems, we haven't had

massive problems with drilling pits caused by pollution. But look up there at Mr. Hansen's graph. What happens when you have no liner? You've got, it looks like, about 70 or 80 years, and that's about the length of time that the oil and gas industry has been operating in New Mexico. So what I'm going to say is, if Mr. Hansen's right, watch out!

But back to what I was saying.

Landfills have double liners, they have leak-detection, they have leachate removal systems which make the waste more dry. So there are a lot of technical reasons to think that a landfill will last longer.

But even if it doesn't, there are just a few landfills. There are now four permitted by OCD, some more permitted by the Environment Department.

This agency or its successors, our descendants, will have the records to know where those landfills were. And while we let -- present regulations let the operator off the hook after 40 years, or 30, whatever it is -- and we know those operators aren't going to be around forever -- but this agency is going to be around for a long time, and so is the New Mexico Environment Department. We will have those records. And if we're on the ball, we will be watching what is happening in the vicinity of those landfills.

If pollution is coming from those landfills, we

should be able to find out about it and trace it fairly quickly and get busy doing something about it. But if you have pollution springing into the aquifer from here, from there, from here, from there, from here, from there -- to use Dr. Neeper's phrase, which is better than my metaphor about the tapioca pudding, if you have pits almost everywhere, my guess is it will take our successors 50 years to find out what's even going -- to figure out what's even going on. And to do anything about it is going to require a massive program of tearing out abatements all over the countryside.

So that is why we need dig-and-haul, Mr. Chairman and Honorable Commissioners.

I'm must about out of my time, but I want to comment on a legal issue, and this is a legal issue which has been raised by our friends in the Independent Petroleum Association of New Mexico. I have to get their booklet here.

Before I go into their legal issue, I want to point out something in one of their exhibits that I think you should look at, and that's their Exhibit Number 9. That's the waste burial study in arid environments, where they say, Few -- the study says, Few data have been available to test the validity of assumptions about natural soil-waste [*sic*] flow...

And it says again -- and I'm not going to be very effective at reading this. I believe the Chairman read some of these statements into evidence -- well, I do have my glasses, I thought I had forgotten them.

> Few data have been available to test the validity of assumptions about natural soil-water flow systems in our arid environments, and even less is known about how the construction of a waste-burial facility alters the natural environment of the site.

Then in another place it says, Preliminary -- Well, I'm going to skip over that one.

On the last page, getting close to the end:

> ...although significant advances have been made in the development of soil-water flow models, the lack of long-term field data has resulted in these models remaining largely untested as to how well they represent flow systems at arid sites.

The article, I think, is not very helpful in assessing what's happening in New Mexico, because it deals with Nevada which is much more arid. But I think those few statements I read should suggest to you, honorable

Commissioners, that when someone is telling you that this model or that model establishes that this is a level that we can safely allow and it won't result in any pollution, that you should, if I may make a bad pun, take that with a grain of salt.

Now in the remaining time I have I'm going to talk about the Small Business Regulatory Relief Act. That was furnished to you as Exhibit Number 20 by the IPANM. I do not know if it was admitted in evidence, but that's not necessary, of course, for this Commission to consider a statute of the State of New Mexico.

There is one thing and only one thing that the Small Business Regulatory Relief Act requires your Honors to do, and that is in Section 4[*sic*]-4A-4.B of the New Mexico Statutes, and it reads as follows:

> Prior to the adoption of a proposed rule that the agency deems to have an adverse effect on small business, the agency shall consider regulatory methods that accomplish the objectives of the applicable law while minimizing the adverse effects on small business.

Two things I want to point out here.

First, it does not require the agency to adopt

any alternative, whatever it concludes. It need only consider.

Second, it is not even -- the agency is not even required to consider an alternative unless it achieves the objectives of the applicable law. What is the objective of the applicable law? Charge of the Oil Conservation Commission is to protect fresh water, public health and the environment.

So you do not need to consider, for the protection of small business or any other kind of business alternatives that will not protect fresh water, public health and the environment.

And I submit to you that it's actually not this Commission's job to consider alternatives that will not protect those values, that if the Legislature feels that a subsidy is needed for any business in this state, the Legislature is free to adopt one.

But that aside, if you, in your process of considering alternatives that will achieve these environmental goals and also protect small business -- and I certainly believe you should do that, the Legislature has directed that you must -- what alternatives would you come up with?

Well, I think you must reject any alternative that exempts any category of business from the rules. I

think you can readily see from looking at federal tax law what's going to happen. People are going to come up with all kinds of ingenious ways whereby the people who aren't eligible for the exemption can act in the name of the people who are, so they can get the advantage of the exemption. I remember writing some very ingenious contracts, attempting to reallocate the benefit of the coalbed methane credit a few years ago.

I think you should also reject any effort to give special treatment to marginal prospects. It's not a bad idea in principle, but I think it's unworkable. The Division actually toyed with the idea in the process of planning this rule. We did not succeed in coming up with anything that any of us were at all happy with, and I don't think the Commission will either.

The only possibly viable thing that I can think of is a rule that permits on-site closure based on an actual testing of the waste at a particular site. And if you're going to do that, the standards I would urge you to adopt to stay within this accomplishes the objective of the applicable law, if you go that direction, and we don't recommend it.

I'll say we don't recommend it, because we think if you do that, the Commission is to a large extent punting to the Division, placing the Division in a position where

it must administer a law that will be a lot more difficult to administer than will the one we've proposed. And a law that's difficult to administer is a law that probably won't accomplish its objectives as well.

But if you go that way, they've got to be low standards. Otherwise they're not going to be achieving the objective of the applicable law. Nowhere near 5000 SPLP of chlorides should be allowed in such a position [*sic*], and in my opinion, nowhere near 1240 should be allowed in such a provision.

I urge the Commission to consider it. I think the Commission should reject it. But if you do accept it, please keep the standards low.

I'm trying to think if there's anything else I need to say before I leave this matter in your hands, and I will -- if I have forgotten something, it's probably something that wasn't that important after all.

I promised you not more than 45 minutes, so I will just say, I don't envy you.

Up to this point -- I know when I was on the bench I had a colleague who said the reason he decided to be a judge was because he decided -- he thought if you had to make a living in the courthouse, the judge had the best seat in the house. And while I'm inclined to agree with that, I think that has been true throughout this proceeding

until -- to that -- that your Honors have had the best seats in the house for this procee- -- for the past five weeks.

But I think now you have the least enviable seats in the house, because you must -- you hold the fate, future of New Mexico's precious resources in your hands.

Thank you very much.

CHAIRMAN FESMIRE: Mr. Hiser?

MR. HISER: It's Mr. Carr.

CHAIRMAN FESMIRE: Mr. Carr going first?

MR. CARR: Yes, sir, Mr. -- May it please the Commission, I -- Mr. Hiser will review the recommendations made by the industry committee and the evidence as a PowerPoint presentation that will address that.

I'm going to review with you for a few minutes what I believe is required of the Commission by the statutes that empower you to act when you're considering rules like those that are now before you.

We'd all agree this has been a long hearing.

When I came before the Commission weeks ago, I believed I was representing an industry -- and I do believe I'm representing an industry that is a good citizen, and I thought you knew that. I represent an industry that I believe makes a huge contribution to the state, and I thought you were aware of what I have seen in the 35 years

that I have worked for this industry, as this industry made giant strides to assure that its activities were protective of human health and the environment.

And then I got here, and I found that my clients were viewed as operating like their grandfathers had operated, they were likened to a monster looming over the state, and a day or two later I became their spin doctor and their attack dog.

And when I got here I found, surprisingly to me, broad-based misunderstanding and basically a contempt for the industry. And it wasn't just on how we manage our waste. It seemed to reach out into things like our activities on global warming. And the reason -- and this is an industry that I would like to come in with you someday and let them explain what they are doing to address global warming.

But I'm concerned about this because in this particular environment I think it's going to be very hard to get a rule that is based on fact and science and law, instead of being based on emotion. And that really bothers me.

And it bothers me particularly because sitting here, it's very clear to me that at the bottom line our objectives are the same. We are interested in doing all that's necessary to protect human health and the

environment.

And we agree with this Division on what you're doing about no unlined pits, even though I had a witness from northwest New Mexico who suggested maybe we were wrong on that.

And we also agree with you on your efforts and the rules that you're developing for permanent pits.

And so there's really a lot more consensus, I think, between all of us in this room than this proceeding would suggest.

The issue we have is with the use of temporary drilling pits, and we have two general areas of concern with these pits.

The first is whether or not these rules are needed, and the second is the impact these rules will have on our ability to produce oil and gas in this state, and I'm talking about the costs related to compliance with these proposals, equipment availability, things of that nature. And we are truly concerned as we come before you today at the end of this hearing, the proposed rule does not properly address either of these concerns.

And as you approach this rule, I think if you are going to make a decision that is correct, it's important that you step back for a minute and remember, Who is the Oil Conservation Commission?

This is a commission, it was created by statute to address a need. And the reason for your existence is that you are recognized as having special expertise and competence in oil and gas matters, and that you can bring this special expertise to certain issues that have been delegated by the Legislature for you to decide.

And in carrying out this jurisdiction you must consider the prevention of waste of oil and gas, you must consider the protection of the correlative rights of the owners of oil and gas wells, you must also regulate the management of wastes that come from this industry to protect human health and the environment, and you do have responsibilities under the Water Quality Act.

And I will tell you, this is not an easy job, because I am absolutely convinced that you cannot pick and choose among your responsibilities; you must do them all to the extent that it is practicable for you to do that.

And I think this case has evolved sort of like two ships passing. We sit here saying waste, waste, and we don't get an echo back, because it's never mentioned by those who have developed the rule. Mr. Brooks didn't use the word in his statement today. And yet it is one of the fundamental jurisdictional bases for your existence, and it hasn't been brought into this proceeding.

In this case, the Division's Environmental Bureau

admitted that in preparing the proposed rule it hadn't considered either the prevention of waste of oil and gas or the protection of the correlative rights of the owners of oil and gas interests.

And I will tell you, this is where the problem begins, because as we all know, the Oil and Gas Act not only provides that the Division is empowered to prevent waste and protect correlative rights, it says, And it is its duty. It is your duty to consider waste.

What we have here are a set of rules proposed by the Environmental Bureau, the most rigorous rules of their kind in the nation. And yet in developing these rules the Division, who has the same duties and responsibilities that you do, the Division ignored the most fundamental basis upon which it is empowered to act, the prevention of waste.

So I look at the rule before you as being developed based on only part of your statutory charge. And when the Division admitted that it hadn't considered prevention of waste and protection of correlative rights, the Chairman of this Commission stated, And that's what this hearing is for. So when the Division fails to meet its duty, that really falls on the Commission. And it puts, I believe, a huge responsibility on you here today, because I think you now have to address a number of factual and legal issues, and you must do what the Division failed

to do, and you must do it based on the record in this case. And it makes it hard, and it is hard.

How do you balance these issues? How do you balance protection of the environment against the -- you know, prevention of waste of oil and gas?

And it seems to me when you approach this, it falls into some sort of structure. You have to identify a problem, and that's the burden of proof. And the party who advocates a change has to bear that burden of proof. And it's on the applicant, and the Applicant here is the Division. If it was ConocoPhillips, the industry committee, NMOGA, whoever it is, the burden falls on them. They have to show there is a need for the rule. And it will be reviewed more by Mr. Hiser, but the evidence in this case simply fails to meet that burden.

And why is a burden of proof important? Well, when the burden isn't met, when you haven't defined and mapped out a problem, there's nothing to measure a remedy against.

You have to have a problem and fashion a solution. And if you cannot define the problem, if you cannot meet the burden, then it's very hard to respond, it's very hard to see how you can use your expertise in oil and gas matters. If you haven't clearly defined the problem, you can't prevent waste, protect correlative

rights, protect human health, groundwater. And here that problem has not been defined.

We've been told for well over a year that there is contamination in New Mexico from pits. Early on, we were told there would be a statement of need. I haven't seen it.

In October we wrote and asked if you could identify the pits you were going to rely on. And we were told, Well, you'll get it when you get your exhibits.

What we've seen to meet the burden of proof are a bunch of pictures -- maybe they would be better if they were after the sites had been closed, but we've seen a bunch of photographs, a list of 400 wells out of as many as 100,000 wells, and photographs of pits and wells that are principally showing permanent production pits. And then to meet the burden we have the infamous list of 10 wells.

I've been here, and I don't remember anyone ever showing us one analysis of anything out of any one of those pits. And I don't remember if anyone ever said that they had done anything more than identified these pits. And they only found, out of 100,000, 10 of them.

You know, I know there's not a lot of data. But before you do something that is going to have a major impact on New Mexico's principal industry, you have to have more than 10 wells with no backup data, all of them from

southeast New Mexico, none of them from the northwestern part of the state, and all of them that violate current rule.

Many companies view this, what has been presented by the Division as not a need for a new rule, but as a need for compliance and enforcement with what we have.

The industry committee believes that there is a way you must approach these issues, and that's the risk-based analysis that everyone just, you know, dislikes. But I will tell you that even if a problem is established, and whether or not the rules appear in the statutes of this state, the word risk, a risk-based analysis, I submit, is required if you're to meet all of your responsibilities under the law.

You must balance the risks of the Oil and Gas Act -- I'm talking about your duties to prevent waste and protect correlative rights. On the one hand, you balance those against the impact these activities have on the environment, human health, groundwater. And I don't know, if you aren't looking at the risks posed by oil and gas, how you can possibly fashion a remedy that protects human health and the environment unless it's okay with you to adopt a prescriptive standard that either over-regulates or under-regulates, and both of these, I don't think, are appropriate exercises of the jurisdiction of an agency

where our Supreme Court recognizes your special expertise and competence to deal with all of these things.

I submit to you that if you are not evaluating risks, you're making a value judgment. You're saying waste is bad, we can't have it. You could deal with that by saying, waste is bad, we'll have no oil and gas development. But that is missing the issue. You're making a value judgment, not a judgment based on evidence and on fact. And a value judgment is a decision reserved for the Legislature, not delegated to the Commission.

And so I submit you've got to weight the evidence, and as far as it is practicable to do it, you have to look at the risk posed, the real risk, not just what we're worried might happen someday 80 years from now, but the real risk against the impact on the industry, and you have to try and maximize the benefits to both.

I mentioned a few minutes ago we have two general concerns.

The first of these is the cost of the proposed rules on our activities in the state.

I think you should look at the evidence that's been presented on, say, the cost of a closed-loop system. OGAP and the Division and others who never drill a well came in here and told us, you know, what the costs were going to be. And in doing that, OGAP used data from a

typical well. You know, well, that may be a way to go. A typical well may in no way reflect the actual cost of installing this equipment on any particular well.

And then they gave us some sales literature from Swaco. I think it's like Mr. Brooks' liner salesmen. You know, of course the people who sell the equipment like it.

And then we had a comparison, a tale of two wells. But on cross we didn't look behind the data to compare the underlying circumstances. And Mr. Robinson for ConocoPhillips noted that when he looked at that, there was a dramatic difference in the casing size that would impact the volume of the waste, and therefore I would suggest that maybe that's not a great comparison of two wells. And all of them concluded that if this industry, the one they recognized is sophisticated in economic matters -- that if this system [*sic*] used a closed-loop system it would save money.

Well, what did the industry say about the cost of a closed-loop system?

I think if you look at the numbers from ConocoPhillips, they presented actual data, not prepared for you but for their management. Remember, they're the largest producer in the Basin, and they showed you what their best guess today is as to the actual costs of drilling deep gas wells in the San Juan Basin and shallow

wells. They have better properties than the average operator up there, they'll be better able to withstand costs that they say it will result in a 10-percent reduction in their inventory and that other companies could be hit harder.

And we can play around, and we did, with those numbers on cross. But in the final analysis, they said it will mean there's an additional quarter trillion cubic feet of reserves in the San Juan Basin that are not deferred reserves but are lost. You need to consider that when you evaluate whether or not you've had a real showing of an environmental problem.

And you know, I said several days ago, and I'll say again today, the numbers from ConocoPhillips, whether they're right or wrong, are the only numbers that count. And it doesn't mean that the numbers from OGAP or OCD are wrong or it was inappropriate. It just means that the ConocoPhillip numbers are the numbers ConocoPhillips will use to drill a well. And those are the only numbers that are going to actually determine the impact of these rules on the level of oil and gas activity in the state.

We're also concerned about the impact these rules will have on our ability to produce oil and gas. And a number of operating issues, things of that nature, will be, I think, addressed by Mr. Hiser, and I'm not going into

those now. But I would like to tell you that as you step back and look at these rules and start evaluating the rule, you need to consider the impact on the industry.

And I think you have to look at the nature of the industry. I think you can see that the companies that have come before you are very diverse. You can see from the witnesses who've been here from small independent companies, from large major companies, how very different it is, how different their approaches are. And they've explained what they see to be the impact of these rules on their activity.

And there are wide variations in the numbers. They reflect the nature of their activities and the way they do their operations. And I don't think they should be dismissed or characterized as inflated or misinformed. They're different, but there are different ways people go about it. But everyone, whether they have $250,000 or $45,000, will see a huge impact on their business.

And I also would suggest that when you develop these rules, you recognize that all parts of New Mexico are not the same. We have very diverse characteristics when you compare the San Juan Basin to the Permian Basin. And a one-size-fits-all rule won't work, because to do that you're going to be actually penalizing one part of the state because of problems that exist in another part of the

state. It's not a one-size-fits-all state, it's not a one-size-fits-all problem, and we have an oil commission with special expertise and competence to deal with that question.

As I've stated, a lot of the people that I'm representing believe that it's an enforcement issue, that the changes in the rule are unnecessary. But we've been working with a draft of the rule, and there are certain specific provisions in the rule that I'm going to address in a more general way. Mr. Hiser will be more specific.

There are certain things we think must be done. And the absolute first thing that must be done is, you must eliminate the 100-mile rule. I mean, if I ever wound up in court on this, I think the word "arbitrary" would come quickly to mind. And it isn't because it's 98 miles versus 102 miles, it's because there is nothing scientific behind the rule. There's simply no reason for it.

And the problem with it is, the problems with this notion of a 100-mile rule permeates every other part of the rule. I mean, it impacts how you can manage waste on your site, it impacts what you can do to get an exception, if you have a better idea of how to handle your waste, and it is woven throughout the entire rule, and it's arbitrary.

The second thing that has to be done is, I would

submit you really have to allow for on-site burial. Now I know it may be harder. You know, Mr. Brooks says it's punting to the Division.

But I suggest if you have an issue involving the development of oil and gas resources in this state, that's the place you're supposed to punt, and that's where they're supposed to catch.

You know, the problem I see, and as Mr. Brooks indicated, this rule is really designed to discourage on-site burial. It's really to push dig-and-haul.

And the evidence that we've presented from Dr. Thomas shows that there really is little risk in a few constituents that should be of true regulatory concern. And then when you get to any realistic receptor, the risk is really small indeed.

Conoco came in, they gave you a presentation focused on northwestern New Mexico. They didn't talk about what goes into the pit. And frankly, it was only when we were working with them -- I was this week -- that it occurred to me that even your pictures were wrong. We should have been looking at what is left when they go away.

And when they showed what they left behind -- I think it was Mr. Wurtz' statement, he said, We didn't leave the nasty stuff. We didn't leave it in concentrations that pose a risk to human health and the environment, but we're

not allowed to bury it on site under this rule.

And the answer seems to be -- and I understand that it seems nice to move it to a landfill where we're going to watch it and we have a problem -- we have one problem. But when you talk about cumulative effects -- and I'm not scientific -- it seems to me that instead of worrying about cumulative effects you've decided to create one huge cumulative effect, put it in one place where it can be a horrible problem later on when it no longer is managed, and hope that Mr. Brooks is still here with his eye watching it so we can all hop to. I'm not sure that's the right way to go.

I think you've got to have a reasonable exception provision in the rule. And this gets us again back to the deep-trench burial. As I understand it, you deep-trench bury if you're not within 100 miles of an approved facility and if you're -- have landowner written consent. But the thing about this is that neither the 100-mile rule nor landowner written consent has anything to do with the protection of human health and the environment, and then -- which I think is a problem.

And I think that problem is compounded by the fact that then we can get an exception if we can show you that we can have equivalent or better protection, as I read it, than digging it out and hauling it away.

So not only do I think deep-trench burial is an illusion, I think the exception provisions. And if that is the standard, then it isn't a standard saying that what we propose is protective of human health and the environment. If it is that we have to show that it's equivalent or better than digging it up and hauling it away, that too is illusory. It isn't there.

I think you've got to have an exception provision that makes them available when there is an appropriate showing that human health and the environment will be protected, and I think that's what was intended by the Oil and Gas Act.

I think you've got to get rid of the landowner veto. I will tell you that I believe that is nothing more than an abdication of your responsibilities to a person who has no interest in the production of oil and gas, no interest in the protection of human health, may have not interest in protecting the environment, he just may want money. And I think you have a responsibility there that you cannot pass that away.

And I've read briefly Mr. Brooks' brief. I think it's a unique legal theory, and I bet we get to talk about it. But I don't care how you rationalize this, I think it's an abdication of your responsibility, and I think in the final analysis it simply will result in authorizing

people to exercise an unconstitutional taking of a protected property right.

We don't have objection to notice. But to require their written approval, I will tell you, I believe is contrary to law, contrary to the Surface Owners Protection Act, and I urge you to be careful when you go there.

I think you also need to adopt a reasonable chloride limitation, and Mr. Hiser will address that. I think that the 250 milligrams per kilogram is inappropriate, and I think you seriously should consider whether or not that should survive in your rule, when you balance the risks and the benefits I believe you're required to do.

As to the below-grade tanks -- and ConocoPhillips doesn't call them that, that's not quite what they showed you, but they did show you what they've done under Rule 50 and incurred a huge expense to do it. And they've shown you that what they have done is actually more protective than what would be required under the rule, and what they have done is truly fully protective of human health and the environment, and I would urge you not to change the current definition in the rule.

And so now we get to a point where I get to be quiet, and I'm so thankful this moment has come. But I

will tell you this in closing.

At the beginning of this hearing, the Division advised all of us that its proposal was to bring the Division rules into line with the letter and spirit of RCRA. Now I'm not sure that's an appropriate standard in a standard in a situation, whereas here you really do know what's going into the pits, and you can really assess the risk they pose.

But while the Division has brought to you a proposal to bring their rules in line with the letter and spirit of RCRA, I want to tell you now at the end of the hearing that it falls upon you to adopt rules and regulations that will bring your rules into line with the letter and spirit of the Oil and Gas Act.

CHAIRMAN FESMIRE: Mr. Hiser?

MR. HISER: If it please the Commission, I think we -- I'll sort of sort through all the different --

Mr. Chairman, members of the Commission, it's my privilege as one of the representatives of the New Mexico industry committee, which is, as Mr. Carr alluded to, a consortium of a number of the operating companies that are active in oil and gas production here in New Mexico, to talk about the proposed Rule 17 and to review for you some of the evidence and the technical issues that you have heard with res- -- you know, and understanding that you do

have technical expertise in these areas and that all of you are familiar with the materials that are found in the oil and gas patch.

What I hope to is a number of things in this presentation, first of all to address, what is the need for the proposed Rule 17?

And to the extent that there is a need, does the proposed rule really address that need?

And if it does address that need, to ask you the question at what cost is that need going to be addressed?

Mr. Carr has addressed some of those issues with cost. I'll address a couple of others of them.

But you're really being asked as the Oil Conservation Commission, what are you going to do to conserve the production of oil for New Mexico? And for that, what cost becomes a very critical issue for you as well, because you have a difficult balancing act.

I then want to talk about what is the industry committee proposing, and does that address that need as well or better than what the Division has presented to you?

And the question I ask you there is, Does the industry committee's proposal result in equivalent levels of environmental protection, or perhaps better levels of environmental protection, and can it do it at a lower cost? Because if we can, that allows you to more easily achieve

the other part of your charge, and that is to conserve the production of oil and gas here in New Mexico. And so it is an important question to you.

Then I'll touch on some recommendations to the Commission that will eventually appear, I believe the Chairman has said for Thursday, in a redline recommended modifications to the final proposed rule that you'll be considering throughout your deliberations.

Is there a need for the proposed Rule 17?

Well, the Division argues that the recently adopted Rule 50 needs to be revised for a couple of different reasons, and we're told in argument that, well, pits and below-grade tanks, or BGTs, are not operated correctly, that they're not closed correctly, that they will threaten the groundwater and that they will threaten human health and the environment, and hence there is a need for this rule to be adopted.

Well, the first question that should come to your mind is, are the allegations that the Division has made -- that these are not operated properly, that they're not closed properly, that they pose a threat to human health and the environment -- actually true?

The Division testified that in New Mexico there have been somewhere between 80,000 and 100,000 pits over the course of the oil and gas play here. Out of that

80,000 to 100,000 pits, the Division has identified 400 to 500 pits that have potentially caused groundwater impact, or are known or suspected to have caused groundwater impact.

And you heard testimony from Mr. Roe, who actually went back through the records of the Division, and he found that many of those may not actually be pits. Some of them might be from pipeline operations and all that.

But for our purposes today, let's just assume that all 500 of the incidents that Mr. Price and Mr. von Gonten addressed are actually pits. Well, even if we assume that that's the case, that's about .5 percent of the pits have caused known or suspected problems.

In the environmental compliance area, a 99.5-percent success rate is very good. And so we have to understand that based on the -- just the statistical record before you, there's not a lot of problems apparently. We'll look a little bit more at what those problems are that we've learned about.

Almost all, 490 of the 500 pits that are known or suspected of groundwater contamination, are permanent or production pits. I don't think that's disputed by anyone. There were repeated questions about that. And we're assuming that all 10 of the remaining ones are drilling pits.

Well, the industry committee supports the proposed Rule 17 as it relates to the permanent pits. We don't disagree that for those a number of additional protections are appropriate. That's been our position throughout this hearing. We may have a quibble or two on a minor issue in terms of the operational standards or the design standards, but we agree with the gist of that proposal.

So we're now dealing with 10 of 500 of those pits there, which is really, I think as Mr. Carr said, the major issue, so-called temporary pits.

We don't believe, members of the Commission, that the Division has made the case that temporary drilling pits are a significant problem. At most, 10 out of that 400 to 500 known or suspected incidents, which is 2 to 2.5 percent of known incidents, may involve a drilling pit.

And if you think of that 10 out of 80,000 to 100,000, we're looking at 0.0125 percent, and for 0.0125 percent we are proposing to substantially change the entire operations of an industry. Need to think about that. 0.0125 percent, and therefore we're going to substantially change an industry with very little documented problems from the closure process.

None of those 10 known or suspected cases involve contamination post-closure, but yet almost all the

Division's sweeping proposals go to the closure and post-closure process.

So there is a disconnect here, members of the Commission. We would agree with that. There is a disconnect between the need that has been talked about throughout this hearing and the remedy which the Division has proposed.

The Division does not want to talk so much about changes in the operating practices, which is where maybe these 10 cases have come from and where some of the problems on the permanent side have been and which we agree that changes should be made, but instead they say, No, let's go to a dig-and-haul remedy for virtually everything that we have, a very rare exception of an on-site boundary -- or on-site burial. But yet we have 0.0125 percent of drilling pits, and none of those involve a closure situation.

Well, what then is the basis for the Division's proposal? Well, we have some operational issues, and we saw 106 slides, sometimes multiple times, of certain pits that had some operating issues, many of them being permanent or production pits.

We don't have any observed closure issues. We have some testimony about operator cleanup at closure under existing Rule 50. But strangely, we believe that the

purpose that was adopted -- that the Commission had in adopting Rule 50 was, when we came to closure of a pit and we found a problem like that, that we would clean it up.

And in fact, you heard from inspector Bratcher in the southeastern field office in Artesia that that had been very successful and that he had believed that all of those cases where chloride contamination had been found, they'd been successfully cleaned up under existing Rule 50.

We have certain historic re-vegetation issues. Dr. Neeper presented those. Pits that had been done 30 or 40 years ago where no one was sure how they were closed, and there were still surficial signs of that, and he expressed some concerns about that. And I want to talk about re-vegetation, because it is an issue of concern to us as an industry as well.

And finally we have what I might characterize as sort of the fear of the unknown. Our model says that there will be a problem, so it must be true and therefore we need to adopt a sweeping change.

Well, we've heard some of the problems and limitations of models, but I'd like to make one observation on this point, which is one that actually Mr. Brooks, for all his disclaimers about being a poor country lawyer has made, that's good, and that is that he said, Well, models are dealing with the average.

Well, if this is the average and we're right now at that cusp of time when we should be seeing the problems under the models or it's five years in the future, if this is, in fact, an average, we should have seen a substantial part of that tail on the bell-shaped curve already, and we haven't really seen that.

And so that to me says that we should be looking cautiously at the fear of the unknown here, because we don't see that unknown, even under the statistical assumptions that we would expect to see actually being borne out.

And Dr. Stephens and Dr. Thomas and Dr. Subl- -- not Dr. Sublette, but Dr. Buchanan all talked about the reasons why we're not seeing that occur. And we'll talk about that in some more detail.

Well, let's then look at temporary pits.

Do these bases that the Division has advanced really warrant changing the regulation and for us to junk the recently adopted Rule 50 in favor of new Rule 17?

Well, operational closure issues are largely addressed by existing Rule 50. As Commissioner Bailey has ably observed, issues of oil on top of a pit are already precluded by your rule, and so that is an enforcement issue.

Certain liner tears and other things are

addressed by the performance standards already enunciated in Rule 50.

There's really no evidence that Rule 50 at closure is not working. Indeed, the only testimony before this Commission from the field personnel that actually do that process is that it is working well, and you heard that not only from the southeast but you also heard that from the northwest.

So the field thinks that the Rule 50 is working well. Apparently the problem, then, lies with the Bureau here in Santa Fe's perception of how well does that rule work?

And the model, I think, is an uncertain basis. We've already talked about the age. Some of those effects should have been seen by now, and we really haven't seen that.

As Mr. Carr said, What evidence has been presented in this record of any contamination from a drilling pit? And the answer is, we've been told there are 10, but we haven't seen any results from those 10 throughout this hearing.

Well, does the proposed rule address the need?

On permanent pits there's no substantive disagreement with the vast majority of the recommendations between the industry committee and the Division. As Mr.

Carr said, there's a lot of consensus in this room, although it tends to get lost in the sound and fury of those areas where there's not consensus, but this is one where there really is consensus.

On temporary pits, on the operating issues, we the industry committee, support the majority of the task force consensus recommendations. We have a few cases where upon further reflection we're not sure that the task force consensus recommendation is necessarily workable, and we'll highlight a couple of those and our reasons for concern. But in general, we support 95 percent or more of what the task force consensus recommendations are. The one exception, since Commissioner Bailey is looking at me, is on below-grade tanks where we think that what was a consensus recommendation was not the definition of below-grade tank that the Division subsequently presented to us, and so that's my big caveat on that issue.

Well, let's look, then, at the operating issues. What are the things that the industry committee does not support in the proposed rules's operating provisions?

First, we don't support multiple permits for a single APD. It's already hard enough to drill a well without having a situation where you may have to get multiple permits for multiple pits or for the closed-loop system if you're doing a drying pad. It's sort of a mess.

We were assured by the Division staff that that's not how they intended to interpret the provision, but there's no doubt that the provision can be interpreted that way.

Ladies and gentlemen who are Commission members, it is important that we try to take that type of ambiguity and that type of issues out of this rule before it goes forward, because those are the types of things that potentially could really make this rule unworkable, not only for us on the industry side but also potentially for the various district offices and even for the Bureau here in Santa Fe.

I think that there's general agreement that we're not intending to require a pit permit for a stormwater pit, but yet the rule as drafted would require those pits to obtain a permit. For what purpose? They're not going to be causing contamination. It would be an exercise in paperwork shuffling with no environmental benefit, and so that's something else that should come out.

I want to talk about the siting limit of 200 feet from a watercourse. We've talked a lot about that. And we were challenged by a number of members of this Commission to come up with what we thought would be a solution to that problem, and we have one for your consideration that I'll talk about here.

We've talked about the 20- versus 12-mil liner.

We don't believe that there's been justification shown for the 20-mil liner versus a 12-mil reinforced liner, where a number of the issues that have been shown by the field staff and all, which were not reinforced liners but were the woven liners, would be addressed by the reinforcing liner. And you heard some testimony from liner installers about the increased difficulty, with the thicker liners, of installation in the field.

Also for pits that are going to be dig-and-haul -- are dug and hauled, of which there will still be many, you have to evaluate the cost for something that you're then probably going to dig back up and dispose, and does it really make sense for that temporary of a liner to require a heavier and more durable liner for something that will only be in place for perhaps six months?

We'll talk about the level measuring device. This was a consensus recommendation, and upon further reflection we have a couple of concerns about it, which I will take up with you, and we'll talk about the time for emptying the pit after rig release.

On siting. Siting is a difficult issue, and we think that the Division and you both are faced with the difficult task of trying to say, well, where should we site a pit, a below-grade tank, or something like that, that will be protective in the long-term? And that's not easy.

From us as an operator it is complicated by a number of other factors, and one of those factors is that we have to work with our landowners. And our landowners typically, if not invariably, have very definite ideas about where a pit should go versus where a pit should not go.

And the more we have siting restrictions from everybody in the process, the more and more difficult it becomes to place a pit or a tank. And if we don't have any pits or tanks, we don't have any oil or gas. And so there has to be some balance which is struck.

Now we're suggesting a limit of 100 feet from a significant watercourse, and we're proposing for purposes of this one rule only, which would be 19.15.17.10, which is the siting restrictions, that a significant watercourse be defined as any watercourse with defined bed and bank, either named on the USGS 7.5-minute quadrangle map, which is what Commissioner Olson asked about, or a first-order tributary to such a watercourse if that watercourse drains an area of five square miles.

Those are pretty significant watercourses. They and the floodplain limits -- which we also agree with, the 100-year floodplain where that's been delineated -- we think, provide a good way to address some very legitimate concerns. Now we are as concerned about them, probably

more than you are, and that would be over flood, where suddenly our pit ends up underwater. That is a highly undesirable thing from our perspective because we have to clean it up. We don't want to be in that situation.

It addresses issue of meander, where that streambed is going to potentially move into our pit over time. That's very undesirable from our perspective as well. The floodplain limit essentially prevents a meander situation from occurring, and we believe the 100-foot limit would as well.

And enhanced leaching, which we're concerned about, where you're in the alluvium itself. Once again, the floodplain issue in that 100-foot marker and using as large a stream course where you may start to have that alluvial issue, we think, all provide good ways of addressing what is a real environmental issue, which is overflow, meander and enhanced leaching in those areas.

What we don't think we need to do, though, is to expand that to every little erosion rivulet that potentially could be discerned upon the land surface, because there are many of those.

One of the issues in the waters of the United States debate, which I'm sure that Commissioner Olson is certainly aware of, is that we end up with more water in the arid southwest than we do in the east of the United

States when you start looking at waters that way.

And that's what we're trying to avoid having, because then you can't site it anywhere except like your landowners' preferred pasture, because that's the only area where that rivulet isn't. And that creates a lot of friction with our landowners, and we want to be good neighbors with our landowners, and we don't want to put a pit in their pasture if we can locate it someplace else. So that's a very real-life issue for us.

On the 12-mil string-reinforced liner versus the 20-mil, there's some cost and installation issues with that. The northwestern inspector testified that he'd had no problems with the 12-mil liners that he had seen. The southeast inspector said that where there had been a few problems they had been promptly cleaned up as part of the closure process, and that he didn't really have a problem with that. That's some good reporting from the field.

We note that we're willing to move to that string-reinforced, because it does address some issues with windwhip, and that is occasionally a problem.

There's nothing that we can do, members of the Commission, about somebody that picks up a stake and pitches it in the middle of our operating pit, and that happens every now and then, and that's something that we try to stop, and we know that everybody on the OCD staff is

trying to stop as well. The 20-mil liner won't stop that from occurring. So we think a 12-mil is probably a good compromise for this type of situation.

Level measuring device. This is a really good idea in theory. It has some problems in practice, and one of those is, what happens if that measuring device goes back into the pit when you're circulating, and you go down the wellbore with it? And not necessarily everything would have that problem, but that's something that we are troubled by, and we're trying to think practically how we would do that. So we have some concern about that. I don't know that it's -- exactly where we're going to come out as an industry committee on that, but that's something that we're in discussions with right now.

What about emptying the pit? Right now the Division has proposed to you two separate rules, a 30-day rule for a drilling pit, and a 15-day rule for a workover pit.

We agree, based on the information that's been presented to you, that for us to remove the liquid from that pit promptly after rig removal is important, because that's when we have a hydraulic head on that pit. You heard Mr. Price talk about the fact that once that hydraulic head is off the pit he thinks a lot of the contamination issues go away, and we think that's true.

The issue for us is how to do that in a prompt way that allows us to arrange for the trucking of that to available SWD disposal capability or to an alternative disposal or use site, because the tighter and tighter that time frame gets, the more likely it is that we're not going to be able to do that, and we're going to have to apply for an exception, or that we're not going to be able to get into that SWD line because that sometimes is a long line and you have to wait your place on it, or that it will have other problems of that nature.

We also know that some operators are working on things like enhanced evaporation systems, which would allow some of that water to be evaporated off. And for that type of thing a 30-to-45-day period works much better, and from a scheduling perspective 30 to 45 days works much better for us.

We would be willing to accept a 45-day for either drilling or workover pits being very workable and very consistent with our obligations to try to remove that water as quickly as we can, given the real-life constraints of not being the masters of our own domain and having to rely upon contractors to provide trucks and other stuff, and they're not always available when we need them to be.

On closure. Well, I think that that first bullet point puts it nicely, which is that we strongly disagree

with the whole direction that the Division would like you to take in closure. We really don't believe that the information and evidence that's been presented to you on this record justifies the strong change in our closure approach that's being recommended to you.

There's no record evidence of non-chloride groundwater contamination from a drilling pit. Therefore, we don't know what the warrant is for BTEX, TPH and 3103 constituents. I mean, if you look at it, there's really no record evidence for that.

That modeling demonstration alone is not compelling. As both Mr. Hansen and Dr. Stephens agreed, they use typical conservative cases for what they were -- done. We should have seen some contamination already, based on those statistics. We really haven't seen it.

You've heard the testimony of Dr. Ben Thomas that the constituents are not of the type and not of the level to raise a human-health or environmental concern at the level where they are.

You heard Dr. Stephens talk at great length about the fact that we went out to develop a level that would be protective, even if all of our engineering controls failed, for the resources of New Mexico. And that's a very important part, and I think one that's perhaps overlooked.

The industry committee and the members of the

industry committee are not recommending that we not have liners and other engineering controls. We are, in fact, recommending that. So we are talking now about the safeguard if those things fail.

And it is a point of great disappointment for us that when industry proposes an engineering control measure they always fail, but if we go to anybody else outside of us, like in the waste management industry, those measures are well engineered and well controlled, and they will never fail. And we're troubled by the persistence of that double standard, that whatever we do will always fail, and whatever anybody else does isn't going to fail.

And in this case we've given you two levels of protection. First, engineering control measures that we do not believe will fail and that are protective. And we are prepared to back those up with concentration and constituent limits that, even if they don't work as we've forecast, would still be protective of the environment and groundwater.

But that is a secondary position, members of the Commission. We are looking at those engineering controls as our primary control, but we're still agreeing that we will put in those secondary measures, that if they do fail, if they worst thing does happen and that liner doesn't work, the resources of New Mexico would still be protected.

And we think that sometimes the focus has shifted to our looking at our secondary control measures and saying, well, that's the only thing you're going to do. That's not the only thing that we as industry have recommended to do.

There's been some discussion about stabilized material and whether the NMED SSLs for migration to groundwater are conclusive proof that what's in a pit is necessarily going to be a threat to New Mexico's groundwater.

Well, both Dr. Thomas and Mr. von Gonten agreed that that was really not the point, that there is stabilization practices that you can use where you may have higher concentrations of the waste that will not cause a threat to the groundwater. We look at that as part of our stabilization process, we look at that as part as part of our engineering controls, that we -- and as part of our commitment to you as being good and responsible environmental operators.

On closure. We continue to maintain our position that the Division proposal is to transfer the chloride issue to the landfills and say, well, we'll deal with them when they finally come around a couple hundred years from now and we're retired, don't have to worry about it.

We're concerned that that elevates the

concentrations in the future and reserves those issues for the future at levels of greater concern where it will be harder to deal with. And you've seen some of our modeling today in Dr. Stephens' rebuttal testimony on that.

We believe that both the Division and the industry committee proposals address re-vegetation, and we strongly disagree with the Division position that landowners have an absolute right to control the surface. And Mr. Carr talked about that, and I won't talk about that.

So what is the industry's -- and I should say the industry committee's preferred solution, since of course you'll also be hearing from the Independent Petroleum Association of New Mexico?

We believe that there's a three-part solution to closure. There's actually a fourth part too, if you think about your exception provision.

First, dig-and-haul if less than 50 foot to groundwater. That was a consensus recommendation of the task force, and we're willing to live with that part of the consensus recommendations. We think that that's a reasonable balancing of the concern for an operating pit and the potential threat to groundwater.

We're looking at closure in place if it's greater than 50 feet to groundwater and we have a liner and a 4-

foot cover, which includes topsoil, re-vegetation. And we've talked about, and you heard, the discussion from our expert, Dr. Buchanan, about what was achievable.

And we're not particularly opposed to the more numeric standard that Commissioner Bailey has inquired about from Rule 36, although we do think that there needs to be that four- to five-year period that Dr. Buchanan talked about before we have to re-plant, in case it's been three dry years in a row for that.

Then we look at benzene at, say, the .2 milligrams per kilogram on a stabilized material, BTEX and chloride using a 5000 milligram per kilogram. And no, that is not a misprint in terms of what our final recommendation is. And that comes from looking at standard DAFs, looking at the model that Mr. Price presented, and looking at the work that Daniel B. Stephens did.

For closure in place, we're looking at levels that would be protective even if that liner was compromised, basically at the time that the pit had occurred -- or was in operating status.

Our third option is deep-trench burial, and there we're looking at 10 milligrams per kilogram for the benzene, still 100 we believe at this point in time for the BTEX, and a 3500 milligram per liter using SPLP unstabilized material.

Now it may be, members of the Commission, that we come back and we talk about 24,800 milligrams per kilogram, which is what you saw on the chart today, because in many ways we think that perhaps that's just a better way because it's an easier test and it's more easily understandable by everybody in the field what that means. And we agree that simplicity sometimes is a virtue. And so in our final proposal that you get on Thursday it may reflect a 24,800. I just don't know yet at this time. We have a meeting later this week for that.

We also agree there with the new liner cover or four foot of cover on top of that, including topsoil and re-vegetation. We believe that is a very protective environment. You've got excellent engineering controls. You have, where the old pit was, excavation under the pit to make sure that where there were any leaks, that those are properly cleaned up. And the reason we're willing to do that in the deep-trench sense is there we can't guarantee that what was in that pit beforehand necessarily would be protective, unlike closure in place where we believe we have a better case for showing that guarantee to you.

The industry pit proposal is superior, we view, for three reasons.

First, the groundwater is protected by the liner.

It's protected by a 5000-milligram-per-kilogram chloride, which we believe is protective of both groundwater and human health, even if that liner is compromised, perhaps even in the operational phase.

We believe that benzene, BTEX and GRO-DRO is protective of groundwater and human health, and you've heard that from Dr. Thomas, and not really any disagreement from anybody else in this hearing on those issues.

And the other levels are not present at levels of health or groundwater concern. And you've heard that repeatedly from Dr. Thomas, you've heard it basically from Dr. Stephens.

Well, that takes care of going down. What about going up?

Well, going up is important too. Going up is in some ways of much more immediate concern than going down. Why? Because we always have a constituent, and that constituent is called the landowner. And that landowner has very definite views about the quality of the land that we leave after we leave and we close, and they are always talking to us about what they think we should be meeting. And I'm sure that's no surprise to any of you who have served on this Commission for any period of time, that the landowners have definite views about what adequate re-vegetation and closure is.

Dr. Buchanan said that that four foot of cover, including one foot of topsoil, is always going to be protective, based on his research and experience, from salt coming up.

There's been some discussion about tight clays, but the uncontradicted evidence in the record is that those are not found in most areas of New Mexico where the pits are allowed. In any event, that's easily worked around by simply making sure that you don't use that tight clay as your capping material.

Dr. Buchanan also established that our native species, the ones that we're going to want to be using for re-vegetation, are easily established, well, are established and tolerant of small movement of salt up into the soil column. And those species are not some unsavory, undesirable, unusable thing. They are in fact natives and palatable for our livestock industry. And that's a very important part, very important part.

Dr. Neeper presented you some evidence -- information showing that, well, plants don't grow at ECs higher than 4. Well, that's true. A lot of field crops don't grow at an EC above 4.

But are we really trying to grow field crops on top of all the pits and the range land of New Mexico? I think the answer to that is that, no, we're not. And even

if we were, how deep do most field crops root? And is that going to be addressed by the cover solution that's already being proposed here by the industry committee? I think if you think about that, you'll find that most of the time we're adequately addressing that by the cover that's being proposed.

So we believe that we have done well by our landowners in our current re-vegetation methods.

Are we perfect? No.

Does the weather always cooperate with us? No.

But as Dr. Buchanan said, If you give that weather five or six years and you get through the periodic dry cycles we have, we will re-establish vegetation. And we will certainly re-establish vegetation before the time that there's any real issue with liner compromise underneath that. And so at that time we're not going to have a big hydraulic head trying to flush a lot of stuff into the subsurface.

Deep-trench burial.

We believe the groundwater, once again, is protected by that closure, primarily looking at, here, a brand-new liner specially designed for that purpose of containing those materials with a cover on it, and then protected by that 3500 milligrams per liter, or 24,800 milligrams per kilogram if that's what it turns out to be,

even if that liner is compromised over time.

We believe that there will be benzene and BTEX and GRO-DRO levels that are protective of groundwater and human health.

We are not uncognizant of the fact that somebody might build something over this. Dr. Thomas talked to you about that, how he specifically evaluated construction worker exposure, how he evaluated residential exposure to these constituents, how he evaluated children and youth exposure to those constituents using current techniques and the best science that we have available, and determined that it was protective at these levels.

We have the same surface protections for the deep trenches that we do for closure in place. We believe this is a very protective standard.

Now there's been a lot of discussion about the various benefits of our groundwater model versus their groundwater model, and there's -- and all that. Why do we think that you should as a Commission give way to what Dr. Stephens has testified? Well, there are a number of issues for that.

First, his are tied to actual New Mexico conditions. In fact, Dr. Stephens has done a lot of the research on vadose zone transport in New Mexico. You're talking to one of the great experts in this issue here in

the State.

He uses a representative range of reasonable worst-case soil types, when he put this together, without resorting to an impossible combination, and that was really what his critique was today. Soils have certain limits within which they have to operate, and you can't distort those entirely and have anything come out. He tried to pick one that was a reasonable worst case for what we would see in New Mexico, and use that.

And that's what he presented, not because he's trying to get industry off the hook but because he wanted to present to you a good, reasonable worst-case scenario that would be found throughout most of the state in the northwest and the southeast.

He addresses the limited size and the mass of contaminants in the pits. There's no way for a pit to grow more salt than it had at the beginning, and that's a big concern of ours as we look at that.

And we did some consideration of the cumulative impacts. What if you did have a bunch of pits all lined up? We talked about that.

Commissioner Fesmire asked a question about, well, what if you had equal volumes of mass? And the answer to that was asked by me and given by Dr. Stephens in his direct rebuttal testimony, which is, the concentration

would still be lower in the pits because it's more of a dispersed thing, you have areas of other groundwater infiltration occurring. And we think that's an important factor to keep in mind because it's the peak, peak concentrations that become very problematic in terms of tracking down and treating over time.

We'll consider some more of the cumulative impact as I get a little bit further for this. Two other points on that, come back.

There's been some questions on this groundwater modeling too, about the average. And I think that Dr. Stephens himself gave the best answer for this, which is that when you're interpreting soil data, it's very important to know what it is, the data that you're interpreting. And so he looked at the various ranges of the data that were available to him, and he picked a number which he said was a reasonable worst case within that range.

Now as he pointed out, there's regional scale models, and those regional scale models include all the preferential impact areas, streams, rivers, playa lakes, mountain fronts and all the area where we know that recharge of the aquifer is considerably higher.

Then you have broad sways of area where you don't really have that much recharge. And under the rule and the

siting limits that are in here, we're going to be locating in those areas of more limited recharge. And so he picked the number that he thought was a reasonable worst case for that scenario.

And I would submit to you, members of the Commission, if you weigh the different expertise of the people who are talking to you on this issue, you have Dr. Stephens who has done almost all the modeling and almost all the soil sampling and almost all the hydraulic conductivity stuff that's been cited by everybody in this room. And so if anybody's in a position to really judge what's a reasonable rate to look at statewide, he's probably the best person here to do that. And his number isn't all that different from the other ones that you've heard, and so I think that's something we should give some consideration to.

What about re-vegetation? Re-vegetation is an important issue, and I think it's one that perhaps has not had as much attention given to it in the past as perhaps needed to. And so in this case we sought out a reclamation expert who had not only theoretical understanding of issues of salt transport and reclamation but also 35 years of practical experience in reclamation in New Mexico.

He was asked, Well, how do you explain, given what you're telling us, why we still have some pits that

are bare on the surface after some number of years? And I think that he gave you a pretty compelling analysis of the different factors that might result in that being true. And I think he explained those causes of past failures.

And more importantly, I think he explained how the industry committee proposal really addresses those, and that is to prevent undue compaction, to make sure that we have good topsoil to put on top of that four-foot of cover and then the one foot of good growing medium on top of that.

That gives us a sufficient rooting depth to not only re-establish most of our native species without any problem, but it also gives us an area where if there is a little bit of salt movement that Dr. Neeper has expressed concern about, that there's still a good rooting medium in there for those plants to have that are not going to be so affected by the salts so that we don't have osmotic stress that those plants are not already used to dealing with.

If you remember, there is a natural chloride bulge, and that chloride bulge is fairly elevated levels, and here we're only talking about a little bit of infiltration of that four-foot area that he talked about.

The industry committee provided you with good New Mexico plant- and vegetation-specific analysis, whereas the environmental community in their information presented

basically crop and agricultural standards. Once again, the question for you is, which is more likely to be used for re-vegetation efforts here in New Mexico? Native species and native forage areas, or are we going to be talking about row crops and strawberries and those types of things that have a very low salt tolerance?

And I think the answer to that is fairly obvious if you look at the landscape of New Mexico. We're talking mostly range and forage crops here, and that's the information that he presented to you and showed that we would be able to establish good, healthy range and forest vegetation with this proposal.

Lastly, Dr. Stephens and Dr. Buchanan both talked about some concerns with the model that Dr. Neeper had, taking away some of the dynamism of the natural system. Dr. Neeper presented his model that showed salt might move both ways, particularly in a tight soil.

And Dr. Buchanan brought out the very great importance of a thing where you have that flux or convective flow of water that actually comes down, helps push everything down. Where you're only dealing with the soil-moisture model, that's not so easy to deal with in the transport side, that convective flux, because we're just dealing with moisture. But yet it's that flush down that we know is a very important contributor to the chloride

bulge that we see, so we know that's an important part of the surficial topography and surficial hydrogeology of New Mexico. And you heard Dr. Buchanan talk about that and you heard Dr. Stephens acknowledge that that was a factor that was very important in that as well.

And we think that the approach that the industry committee has presented to you with the four-foot cap addresses those issues of how those salts will come down. We've talked about having a -- to make sure that we don't get excess water in, having some caps in there and all that. So we think we've presented to you a very protective engineering solution, and then eventually also a backup solution as well.

Why else do we think the industry pit proposal is superior? Well, we think it minimizes the adverse consequences more successfully. We think there will be less truck traffic, emissions and injuries on a per-unit-of-production basis, because if we go to a dig-and-haul remedy, which is what the Division is recommending, there will have to be more trucks on the basis for handling the material that has to be hauled out.

And even if we go to a closed-loop system in order to minimize the amount of waste and that amount of truck traffic, then we're going to have more trucks with the closed-loop system. So it's almost an ineluctable

conclusion that the Division's proposal is going to increase truck traffic and, as a result, some number of traffic, emissions and injuries on a per-unit of production basis.

We believe that our proposal avoids hyperconcentration in landfills that will eventually require treatment after post-closure care ends.

If the liner fails, we think that the small dispersed levels will eventually clean themselves up, because there is not an infinite mass of contaminant in them. And while we don't like to think about that any more than you do, it is a reality that should be given some consideration.

And finally, the small pits, basically fail-safe in that liner holes earlier will further disperse the concentrations by limiting the peak that you'll see, and potentially also the cumulative impact.

And if you think about that, that's because if there's a small hole in one of those liners that occurs during closure activity, there will be some partial leaching of those pit contents over a much slower period, a longer period, and as a result that peak is going to be further distributed over time, and that will tend to bring the peak down.

And that's why we think that this proposal is

protective, although it is our hope that, in fact, liner holes and liner failure never occur, which is what our hope is, as we move forward.

Well, that ends my real discussion about pits. Let's talk about another important part of this rule that hasn't had enough discussion, and that's below-grade tanks.

And on the statement of need, we are at a loss as to whether the Division has offered even a single piece of evidence that existing rules for below-grade tanks are inadequate, that there's been any releases from below-grade tanks or that such a below-grade tank has posed any threat to human health, environment or groundwater at all.

My recollection of the 106 photos at the very beginning of this is that there were no pits, and I don't believe that we -- no tanks -- I don't believe that we have see any tanks anywhere and -- with any problems shown with those.

And so I guess our question is, in the absence of evidence in the record, how does the Division justify sweeping changes that will undo over $125 million of industry investment in a protective technology, much of it in discussions with the Division's own staff?

There's really no apparent problem here. The field inspectors didn't seem to have any problems with tanks, or if they did, they didn't discuss them with us

during their testimony.

The Division proposal undoes extensive work by a number of operators in consultation with the Division staff. We heard from ConocoPhillips about what they had done of spending over $125 million. They're only one operator in the Basin.

And the last thing that we would observe -- and this was in the cross-examination of Brad Jones -- is that the BGT part of this proposal is extremely poorly drafted, and it really needs to be remanded or else replaced entirely before it were to be adopted.

There are four separate references to secondary containment and leak detection. Those could be interpreted as being additive as it's presently written, which would mean that the Division is requiring potentially tertiary or quarternary secondary containment, and that is completely unreasonable for the risks that these types of units would do. So we would strongly, strongly, strongly urge you to at least remand that section if you don't rewrite that whole provision in its entirety, to avoid some drafting issues.

What do we recommend on below-grade tanks? We think you should keep the definition the same as existing and rewrite those provisions to provide for clear, concise requirements.

And while it says the industry committee has provided, we will provide a draft that eliminates a number of those repetitive references and achieves the results the Division was seeking without creating the ambiguity, and we think that that would then be an acceptable below-grade tank provision.

Well, what do we do about ConocoPhillips and ConocoPhillips tanks which are below grade but really don't seem to be below-grade tanks in the traditional sense of the term?

This was a big subject of discussion in front of the Governor's task force, and there was a consensus that was reached at it. And that consensus was that after this rule's effective date, that we would place those tanks in a way that either you could inspect visually the bottom to make sure that they weren't leaking, or that there would be a deflection liner underneath that tank, so that if there was a leak, that it would come out to the edge of that liner and you could inspect it there and see it to prevent those tanks from leaking.

We are proposing to you a draft of a new definition for a subgrade tank that would achieve that task force consensus recommendation, which we agree with, we agree with the members of the task force, and we think that that's a prudent thing to do.

We don't think that those tanks need to be fully permitted, because they sit there, they've got great leak detection, there's visual inspection, there's not going to be any likelihood of significant contamination that we're not on top of within a very short period of time.

And we think that given that ConocoPhillips alone has like 6500, and I know that there's a number of other operators have thousands of these things, so there's more than 10,000 of them, the burden on the staff and the industry for no reason of trying to permit all these things is just not worth it.

Tracking, leak-detection, spill reporting and response under Rules 116 and 19 provide for more than adequate protection for these tanks, which are outfitted in the way that you saw from ConocoPhillips, or one of the equivalent things that's been adopted by one of the other operators.

So briefly in summary, what are some of the industry committee comments on the proposed rule? And you'll be getting an actual redline from us giving our recommendations in more detail.

For permits, we think there should be a single permit for all of these permittable units at an APD, registration only for subgrade tanks.

On the application, we believe the hydrologic

report for temporary pits and below-grade tanks should only be as needed to satisfy the siting requirements. We think that anything else invites a lot of ambiguity, a lot of expense for very little gain on either your part or our part.

On the siting requirements, our principal request is that the definition of watercourse for siting purposes be limited as we discussed earlier, as a named draw or a first-order tributary that would drain, say, a five-square-mile area. That broader definition forecloses too many locations after landowner, endangered species, archaeological and all sorts of other concerns are taken care of.

On the design and operating standards, the below-grade tank standard is in serious need of revision for clarification, and we would commend to you our draft which we think achieves the same things as the Division was trying to do.

We don't believe that subgrade tanks should be regulated as below-grade tanks, because they really represent a best practice and a significant commitment by industry to improving our environmental performance.

And you have heard from Gregg Wurtz all the different steps that the ConocoPhillips folks had gone into in trying to develop the most protective form of this tank

that they could. And we think that that effort should be recognized.

On pits, we don't believe the 20-mil liner is warranted by the testimony and that the 12-mil reinforced is adequate and is protective, even in the southeast, and we're generally supportive of the other task force consensus items.

On closure, the drastic remedy of a ban on in-place closure is not warranted by the evidence presented to the Commission.

There's no contamination post-closure that's known or suspected at this time.

Modeling shows not necessary for protection. You have the work that was done by Dr. Stephens, the testimony of Dr. Ben Thomas.

Salt-surfacing concerns have not been borne out by the evidence. Dr. Buchanan could not point out one example of that in all of his 35 years and seven or six thousand soil profiles he's worked with, if those pits are closed per modern practice.

We believe that closure in place is fully protective of the 5000-milligram-per-kilogram limit proposed by the industry committee by -- for closure in place, and that's for both direct exposure and for groundwater.

We think that direct -- deep-trench burial is fully protective of the 3500-milligram-per-liter or 24,800 milligrams per kilogram for both direct exposure and groundwater.

And we think that the capping with the four foot of cover allows successful re-vegetation and presents salt-surfacing concerns that Dr. Neeper legitimately raised, given past problems in the days before we permitted mixture of pit contents with the surficial soils.

So in conclusion -- I'm sure everybody's happy to hear those words -- two thoughts for you, or two slides.

The principal benefit of the Division proposal really comes down to this -- the consolidation in the landfill and reduction in the number of units that the Division has to watch -- but we think that comes at a pretty high price: the high-concentration, long-duration plume in the future that will require addressing long after the post-closure care period that's presently contemplated in the regulations.

We believe the industry committee proposal achieves the same goods as the Division proposal but without the following costs:

We don't have to spend the money for unnecessary hauling and truck traffic and replacement of all those perfectly good subgrade tanks with revised below-grade

tanks as the Division staff's proposal would cause.

We can avoid many of the emissions increases for incremental truck traffic on a per unit of production.

And the same thing, the injuries and fatalities that are associated with incremental truck traffic on a per unit of production basis.

And we believe that dispersed pits avoids most of the cumulative impact and, compared to a landfill, more quickly self-corrects, should there be a problem with its engineering control system.

Now we're not relying on that, our preference is to rely upon on those engineering controls.

So we believe that the Division's preference for a "class-based" prescriptive system of waste regulation, which is really based on the RCRA subpart C program, does not justify the cost in --

jobs,

doesn't justify the cost in lives, people exposed to the truck traffic,

or injuries to those folks,

or to the property of our landowners that will be damaged when a truck goes off and hits their cattle guards or fences or corrals or any of the other innumerable things that can happen in the field,

it doesn't justify the increase in emissions,

both of greenhouse gases and of dust and of other types of emissions that you will see,

it doesn't justify the cost in the resources to the industry, which will cause more than a quarter of a TCF of gas to be left in the ground, based on the information before us, and that's just from a single operator, to be left in the ground,

and it doesn't justify the cost in the revenues to the State of New Mexico

-- when it delivers no health benefit compared to what the industry committee proposal would do, provides little benefit to the surface and will result in multiple long-lasting high concentration plumes at some point in the future, instead of an admittedly greater number of shorter-duration, lower concentration plumes that have been designed specifically to basically meet the Water Quality Control Commission standards.

And for those reasons, members of the Commission, we believe that when it comes down to your hard task -- and it really is a hard task -- of trying to balance, you know, prevention of waste, protection of correlative rights, and these very important environmental goals that are laudable, that we just don't believe that the Division has proposed to you the best way to try to achieve those goals.

We believe that what the industry committee has

proposed achieves almost all, if not all, of those same goods at a considerably lower cost, and that you should give serious consideration to that.

And I tank you for your time and attention to a very complex proceeding.

CHAIRMAN FESMIRE: So, Mr. Hiser, when you said 20 to 30 minutes, you meant 20 plus 30 minutes?

(Laughter)

MR. HISER: Did I go that long? I'm sorry --

CHAIRMAN FESMIRE: Yes.

MR. HISER: -- if I did. It turns out there's a lot more stuff than I thought.

CHAIRMAN FESMIRE: Ms. Foster?

MS. FOSTER: Thank you.

Mr. Chairman, members of the Commission, in representing the Independent Petroleum Association of New Mexico at this hearing my concern was that of the small operator and small businesses of the State of New Mexico. They have a lot of concerns with this rule. There's concern for their livelihood, concern for safety, concern with the increase in regulatory cost and therefore the impact on them and their businesses.

It is our position that this rule did not take economic impacts into consideration prior to being written. We contend that the OCD did not present any economic

evidence at the hearing that was based on any valid operations numbers. We contend that they did not meet their burden of proof in this case to you at the Commission.

We ask for a balance. This Commission and the OCD had to demonstrate the impacts to industry and small businesses versus the protection of environment, and the OCD did not meet that burden.

There were guesstimates given by Mr. Carl Chavez. He guessed that a typical well would cause 100 additional trips on the roads using a 100-mile-radius rule.

He guessed that a typical well would cause 1000 cubic yards. In fact, that 1000 cubic yards is well below even the smallest 4000-foot-well estimates given by Mr. Small later.

We heard over and over from the OCD with that evidence that the cost of contamination is greater than the cost of prevention. Well, I would remind you -- and look at the definition of contamination. Contamination is the impact causing unclean soils. Cleaning up a spill definitely costs less than the demonstrated cost of closed-loop systems and dig-and-haul.

The Oil and Gas Accountability did pick up the responsibility of doing the numbers for the OCD. However, their numbers were not based on New Mexico operations. And

they clearly did not have an understanding of the surface waste management rules and regulations when they were recommending that we leave chloride-impacted drill cuttings on site as one of the reasons to reduce costs.

IPANM presented evidence. We presented a strong, cohesive case with credible witnesses who actually work in the field on a daily basis. We showed you impacts, the economic impacts, the safety impacts and the health impacts of this rule. We maintain that there are serious violations of the Small Business Regulatory Relief Act in the case as presented.

The rule is very complex, as demonstrated by several witnesses.

There was testimony by Mr. Chavez, who stated that even though he had worked on the rule himself for three months, that he still was not able to fully understand the impact of the 100-mile radius.

There was testimony by Mr. Jones where he testified for two whole days, line by line, on this rule, demonstrating how complex this rule really is.

There was testimony by Mr. Foutz under questioning that he did not understand the rule or the complexities of this rule.

And finally, Mr. Sean Robinson and Mr. Gregg Wurtz from ConocoPhillips stated that there were surprises

every time that they reviewed the rule, and they had been working on it as industry experts for several months.

We maintain that this rule conflicts with existing rules. The surface waste management rule, which was just passed by this Commission last year is clearly in conflict with this proposed rule in terms of its standards.

Small registered landfarms can't take drill cuttings. The 500-milligram-per-kilogram and the 1000-milligram-per-kilogram chloride allowances are allowed for small permitted landfarms where these items are left on the surface for three years.

Mr. van Gonten stated that it's because the difference between a small registered landfarm -- or a landfarm versus a pit closure is that the moisture content in the drill cuttings in the landfarm is different, that it's actually drier.

Well, I ask you, what if it rains? And isn't water added to a landfarm in order to bioremediate? And how is this different from drill cuttings left on the drill pad?

The OCD sampled in the northwest, and several of those results were from unstabilized pits. And further, several of those results could meet the standard, so why not allow in-place burial?

What is the standard for landfarms to leave in

place? Again, the chlorides shall not exceed 500 milligrams per kilogram if the landfarm is located where groundwater is less than 100 feet but less than 50 feet [*sic*] below the lowest elevation.

But what's the standard for pits? It's 250 milligrams per kilogram, chlorides, and the WQCC water standards.

In relation to the Small Business Regulatory Relief Act I'd like to address the statement made by Mr. Brooks that the Independent Petroleum Association did raise the legal question of the Small Business Regulatory Relief Act. We did, and this was the focus of our case.

But the independents in this state are not asking for special treatment. We're not saying that because we are marginal producers that you should ignore the wastes that come out of our locations.

What we are saying, however, and what we have asked for, is that you look at the balance on the impact to industry versus the protection of the environment.

We would support Mr. Brooks's statement that on-site closure, based on the chlorides level, would allow on-site closure is probably a good rationale. It is based on science, it is based on best-management practices, it is based on flexibility. And that is what the Independent Petroleum Association of New Mexico would ask of this

Commission in creating a rule.

We believe that this proposed is in contrast -- or in conflict with the spill rule, which is 19.15.3.116. There's an assumption that contamination has occurred. Looking at Section 15.12 sub 4, it states, If the integrity of the pit liner is compromised or any penetration of the liner occurs above the liquid surface, then the operator shall notify the appropriate Division district office within 48 hours.

It continues to say that if a lined pit develops a leak or if any penetration of the liner occurs below the liquid surface, then the operator shall remove all liquid above the damage or leak line.

This seems to be completely in contrast to the existing spill rule, which clearly states that you must not report -- you must clean up, but you must not report a spill that is less than five barrels. This proposed rule seems to indicate that an operator, even if they can't detect a spill, but they see a tear in the liner, that they must report that to the OCD, which is in contrast to the spill rule.

We believe that this rule conflicts with the BLM standards and the gold book. The on-site closure on federal lands allows for on-site closure, or the taco approach, with a four-foot topsoil. The BLM encourages on-

site closures and best management practices which allow for flexibility and new technologies to be used, specifically when it comes to re-vegetation standards. The BLM rules are, in fact, less stringent, as stated by Mr. Wayne Price in his testimony.

We believe that this rule conflicts with the Surface Owners Protection Act, which was passed by the Legislature this past year. Under SOPA, the operators must pay for permanent loss of value to land, not the expected or possible permanent damage. And we would cite -- we would urge this court to look at the McNeil case for that standard.

And finally, I think this ground was very well covered by Mr. Carr in his presentation, but we believe that this rule is in direct contrast to the WQCC standards, wherein it is the WQCC's job to set the standards for the OCC to follow -- or the OCD to follow, but not to exceed for the protection of groundwater.

This rule was also just changed in 2003. Where are the reasons for change? Where are the stated reasons for change? Mr. Wayne Price stated that he has 200 cases sitting on his floor that are not fully investigated, but they are self-reported, self-contamination cases. Is this conclusive evidence of a lack -- or -- is this conclusive evidence of contamination, or is this, in fact, a lack of

enforcement of the existing rule?

Mr. van Gonten believed -- stated that there was a desire of the OCD to be first in the nation to force oilfield waste to landfills. This is not meant to be a pilot project or a test project. This rule has to be based on science and reality. It's not to be -- it's not a race to be number one in the nation.

Mr. van Gonten stated that less enforcement time and OCD money will be spent with more prescriptive standards under this rule.

Is this really the purpose of recreating this rule, so that the OCD has a more prescriptive standard so they can enforce less?

I would maintain that again, it's the OCD's job to enforce the rule that is there, not to give them the allowance to get out from their responsibilities.

Now what does this rule require?

If the distance to water from the bottom of the pit is less than 50 feet from the surface, the operators must do closed-loop.

Mr. van Gonten stated that the State Engineer has calculated that the majority of the San Juan Basin is 60 feet to groundwater. In other words, if you have a 10-foot pit, then it's from the bottom of the pit to groundwater, you very well could be within that 60-foot distance very

easily.

Again, Mr. Wayne Price states that he has cases on the floor, and there was a repeated statement that there were 10 cases of contamination in the State of New Mexico. But again, I would remind you that those cases are not fully investigated, they are currently still sitting in Mr. Price's office, and that we never even saw any evidence as to those cases.

I assure you that if those cases had been fully investigated, we not only would have heard exactly where those wells were, but we would have heard the exact chloride limits, we would have heard distance to groundwater and the specific details on those cases. But we did not hear any of that.

The distance to groundwater, the 50 feet to groundwater, was a consensus item. And Mr. John Byrom, who is the president of the Independent Petroleum Association, was on that task force, and he did agree that the distance, 50 feet to groundwater, was a consensus item.

We do agree that closed-loop systems are necessary for drilling in shallow areas, in karst areas, in areas with old pipes. But these issues are best left to the discretion of an operator. It should not be in a regulation, a one-size-fits-all rule.

We also would maintain that in all of Sierra and

Otero Counties, this rule, or the changes to Rule 21, would require closed-loop drilling in all of those counties, irregardless of distance to groundwater, which is very disturbing to IPA, who does represent some companies in Otero Mesa -- who are operating currently in Otero Mesa.

The second provision is, if an operator or a well is less than 100 miles from a landfill, then the operator must haul all the wastes.

Mr. Wayne van -- Mr. Wayne Price stated that this was an arbitrary distance. Mr. Wayne van Gonten [*sic*] stated that the NMED solid waste goal was to make it quite stringent on industry, that there was no detailed analysis. The 100-mile rule was just based on looking at maps.

He also stated that the 100-mile rule is designed to prevent most burials or, as he aptly called them, open dumps.

Now, we do address -- we do acknowledge the fact that we can use earthen pits. Unless we're within the 50 feet to groundwater, this rule does allow us to use earthen pits. But in reality, why would an operator use an open pit? There's an additional testing cost, there's an exposure to OCD violations and an inspector coming on site all the time, an inspector -- and the necessity to report requirements for small -- minor spills, that would be contrary to Rule 116.

There's the excessive delineation requirements that are not based on science.

And then finally, there are the safety requirements.

There's uncontroverted testimony in this case that what is in the pits is not a danger to human health or the environment in the doses found. The presence of constituents in pits does not automatically equal impairment to human health.

Addressing the air drilling and the cavitation methods. In the San Juan Basin you heard testimony from several witnesses, both with the IPANM case and individuals who came in under sworn testimony, that air drilling and cavitation cannot be used in a closed-loop environment, therefore they will have to dig and haul. And the question is whether dig-and-haul will make those wells uneconomic.

You heard from the Conoco witness -- the ConocoPhillips testimony that there was really only one air drilling closed-loop system in the world, and that is currently in Algeria. And to try and build that system and to run it would cost -- would add an approximate $300,000 cost to what would amount to a $750,000 well in the Fruitland Coal Basin.

So what is better than dig-and-haul?

Mr. Wayne Price was actually asked that question

on his direct -- on his cross-examination, and his response was very telling. He stated that given the deep groundwater issue, if the water is deep enough, then stabilization would be adequate and would, in fact, be better than the dig-and-haul provision.

Let's look at the landfill question. Is leaving drill cuttings at hundreds of small pits better than bringing drill cuttings and dirt to one centralized 500-acre landfill?

CRI is an unlined landfill in the State of New Mexico. Landfills -- Landfarms can take chlorides up to 100 milligrams per kilogram and leave them on the surface for years. We need landfills in the State of New Mexico to take real solid waste.

And finally, which communities in New Mexico would be willing to have municipal landfills, i.e., as Mr. Wayne Price called them, sacrifice areas? How often does a landfill become a hazardous Superfund site?

And finally, as to the issue of liability, I would remind you that the owners of landfills are released from liability 30 years after closure. And if you look even at Mr. Ed Hansen's modeling, it will take 1500 years for chlorides to impact in the pit situation. The question is, how quickly will those chlorides impact in a landfill situation? Which is, I remind you, only a 60-millimeter

polyethylene liner and a clay liner beneath that.

Yes, they do have monitoring wells. Yes, there are people at landfills who are required to monitor. But that is only while the facility is accepting waste. Once they're no longer accepting wastes, there are not people who are monitoring it after the 30-year release period.

Looking at the 100-mile zone, you can only deep-bury in place if you meet the test requirements and you obtain surface owner written approval. We would agree with the requirement that is currently under statute that operators should give notice. That is part of the good-neighbor process that NMOGA started and the Independent Petroleum Association agrees with. We should be notifying our surface owners, and we should be working with them. However, we do not need to give them the right to veto our operations, or to impact our operations and cost us additional unreasonable economic and health costs.

We believe that the surface owner written approval provision violates the rights of the mineral owner to use the land as is reasonable for drilling operations, and it gives the surface owners more rights than were given in the statute, in the Surface Owners Protection Act. This provision in this rule clearly expands on Legislative intent of SOPA.

As to the below-grade tank issue, if an operator

followed the requirements of the last pit rule, which was revised in 2003, and they retro-fitted all the below-grade tanks, then under this rule they will now need secondary containment and leak detection.

Mr. Eric Hiser just completed his testimony -- or his closing statement -- his closing statement, and referred very heavily to the presentation that was given by ConocoPhillips.

We would agree with the distinction that is proposed by the industry committee on the below-grade tank issue versus the subgrade tank issue, and we'll -- I'll just leave it at that for now.

But we would maintain and remind the Commission that we don't believe that there was any science or a demonstration that below-grade tanks leak or impact the environment as they currently stand.

So what did IPANM demonstrate in this case? What did we prove?

We demonstrated that economic and societal costs outweigh the marginal environmental positions taken in this case by the OCD.

Mr. Sam Small testified to the typical well. He did quite a bit of analysis and research based on real facts and numbers to create volumetric waste amounts.

He created a typical well, a 7500-foot well in

the northwest and the southeast, the 4000-foot well in the northeast [*sic*] and the southwest [*sic*]. He did a detailed study of factors affecting the costs.

He found that in the southwest [*sic*] a 7500-foot well would have an increased difference in cost of $48,000 just between the use of a closed-loop system and closed-loop dig-and-haul, and -- while there is a $56,000 difference in the current systems used versus the haul provision.

And the total difference in cost between just the system that's used now is $43,500, but if you used a closed-loop system and haul everything, the total cost is going to be over $132,000.

In the northwest, the 7500-foot well, the question is a deep-trench versus haul. In the northwest, I would remind you that currently on-site closures are done. Deep-trench is not done, and therefore using a deep-trench in the northwest would cause a cost differential of over $53,000, while the closed-loop versus the closed-loop haul would also be a $53,000 cost differential.

In the northwest, the difference in costs actually was the cost of hauling. For liquid disposal it is an astonishing $905 a load to haul water in the northwest. For the 7500-foot well, that would be 45 loads of water. For the solids disposal it's $475 a load, and

that would be 80 loads, for a total of 125 loads for your typical 7500-foot well in the northwest.

I won't go through the rest of the numbers, but I -- the specific numbers for the 4000-foot well for the southeast and for the northwest, but I would remind you that there was a lot of discussion in the testimony on the cost differentials between -- of a closed-loop system.

We heard a lot of testimony on the Swaco numbers, and I would remind you that the Swaco numbers use a closed-loop system that costs $127,000 just in equipment, while the closed-loop system that was presented by Mr. Sam Small was $57,000 in hard equipment costs. But that obviously did not include the additional water tanks, et cetera, that would be needed.

The Swaco one used two dehydrators, separators, and a de-watering system that was not used in the closed-loop system that was presented by Mr. Sam Small.

You also heard testimony from Mr. Al Springer of Yates Petroleum, who gave you actual numbers on a southeast New Mexico well. They reason they use closed-loop is because they were drilling in karst. He gave you a closed-loop primary, and he talked about the different pieces of hardware that were necessary and the complex nature of the closed-loop system, the difficulty in getting the equipment, the difficulty in getting the adequate

assistance and help and qualified people to run the closed-loop system.

He estimated that currently his closed-loop system is going to be a quarter of a million additional and incremental costs.

He stated that it would have a larger footprint, the closed-loop system would have a larger footprint. And it's not because of the actual space that the hardware takes, it's because of additional safety reasons and concerns that are needed with a closed-loop system, in that you have to be able to get in and around the hardware, and therefore you have to have roads around your location. So is that actually part of a larger footprint? We would maintain that it is.

He also highlighted safety concerns in the southeast, the waterfloods, the changes in pressure and the fact that there are lots and lots of valves, that you can quickly have an out-of-control situation with a closed-loop system.

You heard from Mr. Tyson Foutz who gave you actual northwest drilling numbers. He had issues of finding adequate equipment and labor, equipment that he actually transported from Wyoming at a cost of $28,000 round trip was not adequate, it didn't dry the drill cuttings enough. He stated that he ended up with slop and

not dry drill cuttings, as necessary to have the adequate savings with the closed-loop system. His estimated cost, on average, for his three wells, was $234,000.

And why were they drilling a closed-loop system? They stated that -- he stated that he drilled in -- he used a closed-loop system because they were drilling in a heavily piped area within municipal limits.

Again, we remind you, we are not against closed-loop systems, but we would like to have closed-loop systems be an option for us, not a mandatory requirement for us in all areas.

You heard testimony from Mr. Tom Mullins, who is a petroleum engineer, with estimated northeast -- northwest Fruitland Coal well costs. His estimated cost for a very shallow well was $3800 for closed-loop systems.

Mr. Tom Mullins discounted the OCD modeling. He stated that there was no solubility testing. He discussed at length the difference between the burrito and the northwest taco. He demonstrated that stabilized materials will not migrate. He discussed naturally occurring chloride levels in the San Juan River, which are lower in the northwest than in the southeast. He discussed the mobility and transevaporation in arid environments. And finally, he highlighted the safety issues in air drilling and cavitation.

I would urge the Commission to look at Synergy Energy's written comments which will detail his testimony even more, for your review.

Finally -- And Mr. Tom Mullins' conclusion, actually, was a request to the Commission to deny the proposed rule and to enforce the current rule as adequate.

Finally, you heard from Mr. John Byrom, who had a very complete marginal wells discussion, that the increased costs would reduce drilling in the San Juan Basin by about 30 percent.

Since he was a task force member, he discussed what his version of the consensus was. He stated that on the below-grade tank issue he felt there was no consensus on the definition, and due to that he could not agree to the outcome in the rule as it related to below-grade tanks.

However, again IPANM does agree with the New Mexico industry committee proposal concerning the below-grade tanks and the subgrade tank proposals.

Mr. John Byrom discussed the impacts and the -- the serious economic impacts of not -- that were not balanced by the environmental impacts proposed by the rule.

And finally, he asked you to redefine the definition of a watercourse.

You also heard from industry, Dr. Stephens on hydrology, Dr. Buchanan as a soil expert, Dr. Thomas on

risk analysis, and you heard from ConocoPhillips on the below-grade issue. This could impact 5000 wells which were recently retrofitted.

And there's a question of validity of lining pits. I believe Mr. Gregg Wurtz actually stated -- he said he preferred the tossed salad method instead of the taco method or even the burrito method. Now we have decided as industry that we will be recommending liners for the pits. However in the northwest, due to the chloride levels, there are operators out there who are not happy with having to line all the pits, I will tell you that, and many of those people are my members as well.

You heard public comment, informed testimony on -- in this case. And many of these folks were IPA members who came at our request.

You heard from Representative Paul Bandy who is a rancher in the northwest. He stated that with communication he feels the use of a closed-loop system and the use of dig-and-haul can be reasonable, but there has to be an adequate scientific basis for it and good communication between the parties. There should not be a stick approach, there should be a carrot approach.

Mr. Representative James Strickler, who is an IPANM member and a producer stated that the provisions in the rule expand his understanding of the Surface Owners

Protection Act, which he was very intimately involved with this past session.

You heard from Representative Candy Ezzell, who is a rancher and a producer, and she is very concerned with the regulatory instability and process that is used at this hearing.

You heard from Representative Dan Foley, who is the minority whip. His concern is also with regulatory instability and the economic impact on the state as a legislator.

You heard from Mr. Dana McGarrh, who owns a service company, who stated he would have to lay off half his employees by January if the impacts of this rule go through.

You heard from Mr. Paul Thompson, who is a producer with 25 years of experience, who maintained -- did not believe that there was adequate science presented in this case.

You heard from Mr. Matthews with M&R Trucking, who stated that he would have to have 30 percent of layoffs, that owner -- and he would face additional landowner complaints about increased traffic with the closed-loop systems that would be instituted.

You heard from Mr. Wieland of Weatherford Industries, who stated that cascade effect would result in

50 percent layoffs as a result of this rule.

You heard from Mr. Jimmy Cave, who was very emotional. He's a small businessman and a service company, and the impact of his small business and working with marginal producers could eventually put him out of business.

You even heard from Dr. Avi Shama, who was not asked to come here by the Independent Petroleum Association. He is a professor -- a former management professor at UNM, and he stated very clearly that the OCC needs to consider the societal costs -- must do a societal cost-benefit analysis of this rule prior to imposition.

You heard from Mr. Larry Scott, who is a producer. He stated that there were lower rig counts, even though the cost of oil skyrocketed, in fact that this rule is nothing more than a $58 million tax on the industry, that the OCD needs to do additional studies, and there's clear uncertainty of regulatory environment that is going to cause companies in the Permian Basin to go to Texas.

You heard from Mr. Jason Sandel from the northwest, who stated that there needs to be a balance. He was concerned about accidents and safety. He stated that the additional equipment needed for closed-loop systems was not available. He was concerned about closed-loop emissions -- CO_2 emissions and the infrastructure issue.

He is a county commissioner up in Farmington, and so the infrastructure -- and cost of the infrastructure is near and dear to his heart. He would recommend a phase-in, a fit-for-purpose with additional economic, environmental and safety impacts studied.

You heard from Mr. Tom Dugan, a producer, who stated there was no evidence for change of Rule 50.

You heard from Mr. John Roe, who is a producer. He has many stripper wells on State Land Office lands. He asked you to enforce Rule 50 and to review the OCD data which was presented. He maintained that much of that data is not only duplicative but incorrect.

And finally you heard from Mr. Pinson McWhorter with a statement that it is more -- that this rule can impact lives, this rule will cause accidents, it will put many more trucks on the road, and one life is not enough -- the loss of one life is not a good reason to not change this rule.

There will be an impact on New Mexicans. There are more trucks on the road. A typical closed-loop system will cause an additional minimum 100 trips from the field to a landfill, and that's the OCD estimate.

As Mr. Brooks stated, you don't have to have dead bodies to raise OCC concern. And I urge you to look at that point from the dead bodies that will be caused by the

accidents on the road. Just looking -- putting -- just instituting closed-loop systems will put trucks on the road, which will cause accidents.

There will be a serious impact on the infrastructure. At a time when the state is $500 million short on infrastructure in the State of New Mexico, is this the time to be imposing a rule that is going to put that many more heavy trucks on the road?

There will be increasing greenhouse gas emissions. Even if, as Mr. Fesmire commented in his rule -- in this hearing, several times, the amount of drilling decreases because operators ought not to decrease, I would contend -- or IPA would contend that the impact on infrastructure, the amount of trucking and greenhouse gases will all increase, because we don't believe that there will be a commensurate decrease in operations.

There will be more landfills, sacrificial areas that will eventually become Superfund site with a thousand times the impact of the small pit locations.

So what will operators do if this rule is instituted?

The increased drilling cost, the increased hauling cost, the increased retrofitting cost and the additional rules that are coming will all cause regulatory instability.

This will decrease investments in New Mexico. It will decrease state revenues which in FY '06 was $2.3 billion. There will be less money in the land grants permit fund, and less operations on the state lands. And I would contend there will be more operations on BLM lands. There will be less money put into capital outlay and recurring expenditures for teachers, police and roads.

And this is already happening. In Dr. Neeper's rebuttal exhibit, there was a clear drop in rig counts versus the Colorado rig counts, which is clearly rising over 2007.

There will be a delay in changing investment patterns with companies, but companies need regulatory stability in order to base their rationale on investing in New Mexico. Companies want to have rules based on science and certain economic impacts that are within the statutory framework.

I would like to thank the OCD for your time and patience in this case. I've observed you over the last 18 days of this testimony, and being a rookie in this case, this is my first time out of the box, and I thank you for your patience in this.

I know that you all have the desire to fulfill your duties in this case and to rule fairly for the environment, the industry and the citizens of New Mexico.

Thank you.

CHAIRMAN FESMIRE: Thank you, Ms. Foster.

Mr. Brooks, did you have a rebuttal?

MR. BROOKS: I do. I promise to stay within eight minutes, since we have that length of time before 4:45.

And I'm going to go in reciprocal order, because Ms. Foster's argument is the most -- freshest in my mind at the moment, and the only thing in her argument that I intend to respond to is an overview of the economics.

I am a little surprised that she put so much emphasis on Mr. Small's testimony, because I think Mr. Small's testimony was thoroughly discredited. Not that I believe he is otherwise and thoroughly honest, but there were just so many mistakes and discrepancies that I think it should not be relied upon.

Now having heard all of the evi- -- and likewise with Mr. Mullins, I don't think this Commission needs to take seriously the testimony on hydrology of a gentleman who doesn't even know what TDS stands for.

Those are the only witnesses I will mention in that way.

I believe, having heard all of the testimony, I strong- -- I believe that you can reasonably conclude that drilling costs will increase if closed-loop systems are

employed, or at least that most operators genuinely think so.

However, I would point out that the paper from Swaco was joined into -- joined by a gentleman from Cimarex. Cimarex is an operator that has a lot of experience with closed-loop systems in New Mexico, and they may have discovered ways to do better. There was a suggestion that Cimarex was affiliated with Swaco, and that may be true, I don't know, but I would suggest that even so, it's unlikely that they would use the system in their own productive arm if that arm was not making money by doing so.

In any case, I think what you come to, the ConocoPhillips witnesses, who were probably the most credible witnesses who testified in regard to costs, said that closed-loop systems will save money, as compared to using a pit and digging and hauling, and I think that's a reasonable conclusion, contrary to Mr. Small's testimony that they too would add on further additions in costs.

I'm not sure where all that lands you, because I believe that the costs of environmental protection are a cost of doing business. It's well established, the philosophy of environmental regulation is that those costs should be assumed by the industry.

So far as the trucking, the increase in

greenhouse gas and other emissions, certainly that is a valid environmental concern, but I don't think you can come to any conclusion on this record as to how much that cost will be. Certainly the industry committee's Exhibit 10 is based on preposterously overstated assumptions and doesn't give you any quantification you can rely on.

And in order to come to a quantification you would have to know how much truck traffic will be decreased because of decreased drilling, versus how much will be increased because of dig-and-haul options. And even if you could use the estimates -- and I think they are too widely varied and too draconian to be reliable of how much drilling will be decreased -- even if you could use those estimates, I don't believe there's anything in this record to tell you how much vehicle miles traveled a given amount of production is, absent the use of dig-and-haul, the trucks for dig-and-haul. So I don't believe you can balance the two when you don't have any evidence to quantify one side of the balance.

Okay, in response to Mr. Hiser on below-grade tanks, I believe the Division when we submit our redline may make some minor modification in our recommendations, because I think we to some extent misinterpreted the consensus, but basically we stand by the permitting and retrofitting of below-grade tanks, with certain exceptions.

One other thing I want -- one other point I want to make in response to Mr. Hiser. There was a lot of talk about salts moving upwards. The Division didn't present any testimony that they would. Dr. Neeper presented testimony to that effect.

Dr. Buchanan, who was basically a pretty credible witness, testified to his studies which tended to show the contrary.

However, one thing is very important, and this is very important when you go to talking about the taco closure, which is in industry committee's submissions and not in ours. We don't propose to ever authorize that, mainly because we don't know how you would know, if you don't pick up waste and bury it, whether there's contamination underneath it or not.

But aside from that, Dr. Buchanan admitted that all of his studies which led to his conclusion that the wastes -- that the contaminants do not move upwards, that none of his studies that led to that conclusion involved a bathtub effect where you had a liner under the bottom and no liner over the top. And so consequently, we believe that we've got a real serious problem where you've got rainwater accumulating in a liner with real serious possibility of upward movement there.

Now referring to Mr. Carr, Mr. Carr has raised a

legal issue that I believe I need to address, and this will be my last shot for this lengthy proceeding.

Mr. Carr has referred to the obligation of the Commission to consider the prevention of waste and protection of correlative rights. Now when Mr. Carr appealed from your surface waste management rule, I urged that it was not necessary to consider those factors in that case because there was no evidence that addressed that subject.

I don't believe that's true here. I believe there is some evidence to address it, and I would urge the Commission to look at that issue and to make findings to enable us to know how the Commission assesses it.

However, I do not recommend any change in the rule on that basis. I believe that leaving gas in the ground -- and the talk was pretty much all about gas -- leaving gas in the ground as a result of not drilling because of increased costs is not a waste issue, because every one of the witnesses, with the possible exception of the ConocoPhillips people -- and they said things that didn't -- I didn't fully understand, but I think -- don't think they were saying anything contrary, I think they were just saying it in a different way.

But leaving gas in the ground is not waste if it will be produced later in response to market demand. And I

believe basically that every one of the witnesses who testified to gas being left in the ground said that if, as and when the price went high enough, that that gas would be produced under the new rule.

Similarly, the only witness who raised protection of correlative rights issues -- and I believe it was Mr. Springer, although I stand to be corrected, I don't remember the witnesses' testimony as well as Ms. Foster does. But I believe he was the only witness that testified to correlative rights issues, and he conceded on cross-examination that he was aware that he could come in, if he's being drained -- if an operator's being drained, and it's not economic to drill a well, a protective well, they can come in and request the Oil Conservation Division to restrict the production of that well in order to protect correlative rights. And certainly the Oil Conservation Division, while it probably hasn't done that much recently, certainly has -- there are a lot of orders on the books where that's been done in the past.

It's 4:45, I thank you very much, and good afternoon.

CHAIRMAN FESMIRE: Thank you, Mr. Brooks.

With that, I'm assuming that it is the consensus of the task -- I mean the attorneys, that we are done taking testimony.

Here's what I intend to do. I intend to ask for comments here in just a minute. We will meet one more time with the record open on Friday of this week. At that time I would request all the written submissions that are available. For lack of a better phrase, I'm going to call them your proposed findings and conclusions, knowing that that is your redline, plus the -- any last substantive arguments you need to -- you would -- you feel necessary to support those arguments.

At that time we will take up the -- we will begin our deliberations. The first part of the deliberations will probably be a lot about scheduling. I don't know how we're going to do it yet. I hope the Commissioners will take the three days and think about how they intend to schedule it and what days they might have available on their calendar. We're going to have to discuss things like the availability of the transcript and those sorts of issues.

Are there any questions on scheduling and when we're going to meet?

MS. FOSTER: Mr. Chairman, will you require our presence for your deliberations?

CHAIRMAN FESMIRE: Nope, the deliberations will be open to the public, but we will not require any -- we will not require any attorneys to be there.

MS. FOSTER: Thank you.

CHAIRMAN FESMIRE: Okay? Everybody understand how we're going and that we're going to be back here Friday morning at nine o'clock if you want to be? Okay?

At this time, is there anyone who would like to make a comment on the record?

Gordon, did you want to take the opportunity?

MR. YAHNEY: Comment on the record?

CHAIRMAN FESMIRE: Yeah.

MR. YAHNEY: No, I would be welcome -- I would make a comment, if you would allow that, but not on the record.

CHAIRMAN FESMIRE: Okay. Well, the rules aren't very clear about comments off the record, so we're just going to skip it for the time being.

Yes, ma'am? Come forward.

MS. HATTEN: Chairman Fesmire and Commissioners, if I could make a comment, I would like to be on the record.

CHAIRMAN FESMIRE: Okay, ma'am. Would you come forward? We have two ways of doing it. You can either make a statement of position, or you can be sworn and make a statement in evidence, and that subjects you to cross-examination, where the former doesn't.

MS. HATTEN: I would prefer the former.

CHAIRMAN FESMIRE: Okay.

MS. HATTEN: I'm not an expert.

CHAIRMAN FESMIRE: Okay. Go ahead, and start with your name, please.

MS. HATTEN: My name is Marianna Hatten, I'm a property owner and a business owner here in Santa Fe County, and I want to thank the Commission for all the hard work and listening to days and days of testimony for both sides.

I encourage the Commission to err on the side of the citizens of New Mexico and the environment of New Mexico, and pass the closed-loop system for waste management of these drilling operations.

CHAIRMAN FESMIRE: Thank you, Ms. Hatten.

Is there anyone else?

MS. FOSTER: Mr. Chairman, I actually just received a text message from Representative Tom Taylor who, I guess, due to the snow is not going to be able to come down here. I will text him back and urge him to send a letter to the Commission, which I hope will be made part of the record.

CHAIRMAN FESMIRE: Okay. I intended to give one more opportunity for oral presentations, oral statements of position or testimony on the record, on Friday morning, or we'll keep the record open until Friday morning -- let's

make it Friday noon -- for any e-mails or faxes that anybody would like to send in.

MS. FOSTER: Thank you, I will relay that message.

CHAIRMAN FESMIRE: Okay.

Mr. Carr?

MR. CARR: Mr. Chairman, I've been involved since 1972 with the Oil Conservation Division and Commission. This is the longest hearing in that period of time.

(Laughter)

MR. CARR: And I also think it's been the most difficult in terms of scheduling. I want to thank you for what you've done, helping us adjust schedules to accommodate all the parties.

CHAIRMAN FESMIRE: Thank you, Mr. Carr.

Any other comments before we adjourn for the evening?

With that, we'll adjourn and reconvene at nine o'clock Friday morning.

Oh, the attorneys that had written closing statements, we'd like to have those today.

(Thereupon, evening recess was taken at 4:49 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 February 19th, 2008.

STEVEN T. BRENNER
CCR No. 7

My commission expires: October 16th, 2010