STATE OF NEW MEXICO
ENERGY, MINERAL AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION COMMISSION

ORIGINAL

APPLICATION OF THE NEW MEXICO OIL AND GAS ASSOCIATION FOR AMENDMENT OF CERTAIN PROVISIONS OF TITLE 19, CHAPTER 15 OF THE NEW MEXICO ADMINISTRATIVE CODE CONCERNING PITS, CLOSED-LOOP SYSTEMS, BELOW GRADE TANKS AND SUMPS AND OTHER ALTERNATIVE METHODS RELATED TO THE FORE GOING MATTERS, STATE-WIDE.

CASE NO. 14784 AND 14785

VOLUME 6

June 20, 2012
9:00 a.m.
Wendell Chino Building
1220 South St. Francis Drive
Porter Hall, Room 102
Santa Fe, New Mexico

THE COMMISSION:

JAMI BAILEY, Chairperson

GREG BLOOM, Commissioner

DR. ROBERT BALCH, Commissioner

MARK SMITH, Esq.

FLORENE DAVIDSON, COMMISSION CLERK

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EXHIBITS

PAGE ADMITTED

(Note: In session at 9:00.)

CHAIRPERSON BAILEY: Good morning. This is the meeting of the Oil Conservation Commission on June 20th, 2012. We are here in Porter Hall in Santa Fe, New Mexico. I am Jami Bailey, Director of the Oil Conservation Division. To my right is Greg Bloom, designee of the Commissioner of Public Lands. To my left is Dr. Bob Balch, who is the designee of the Secretary of Energy, Minerals and Natural Resources. We are gathered today and have the ability, if we have an overflow crowd, to be able to transmit audio/visual out in the lobby so we do not violate any fire restrictions for the number of people within the room. If we are not too crowded we will go ahead and shut it down so we are not just broadcasting out in the lobby just because.

Have the commissioners had a chance to read the Minutes of the previous meeting which was on May 14th, 2012?

COMMISSIONER BLOOM: Yes.

COMMISSIONER BALCH: I have.

CHAIRPERSON BAILEY: Do I hear a motion to adopt the Minutes as they have been drafted?

COMMISSIONER BLOOM: So move.

COMMISSIONER BALCH: I will second.

CHAIRPERSON BAILEY: All in favor?

DR. BALCH and MR. BLOOM: Aye.

CHAIRPERSON BAILEY: I will sign on behalf of of the Commission. Today we have a continuance of Case No. 14784 and Case No. 14785, which were the Applications of New Mexico Oil and Gas Association and Independent Petroleum Association of New Mexico for the Amendment of Certain Provisions of Title 19, Chapter 15 of the New Mexico Administrative Code Concerning Pits, Closed-loop Systems, Below-Grade Tanks and Sumps and other Alternative Methods Related to the Foregoing Matters, State-wide.

We have consolidated these cases for the convenience of the Commission. I will sign the official consolidation order on behalf of the Commission and transmit everything. I ask for appearances today to make sure we have the same attorneys that were previously here and to ensure that we have all persons represented.

MR. CARR: May it please the Commission, William F. Carr with the Santa Fe office of Holland & Hart. I am appearing representing the New Mexico Oil and Gas Association.

MS. FOSTER: Good morning. Karin Foster here representing the Independent Petroleum

Association of New Mexico.

MR. JANTZ: Good morning, members of the commission. Eric Jantz for the New Mexico Environmental Law Center. I am here is our intern, Claire Dechamber.

MS. GERHOLT: Madam Chair, commissioners, Gabrielle Gerholt on behalf of the Commission.

MR. DANGLER: Madam Chair, commissioners, Hugh Dangler for State Land Office.

MR. NEEPER: Don Neeper representing New Mexico Citizens for Clean Air and Water. Dr. John Bartlett is also with us today.

CHAIRPERSON BAILEY: Mr. Fort?

MR. FORT: Patrick Fort for the Jalapeno Corporation.

CHAIRPERSON BAILEY: It may be worthwhile to repeat that before lunch. We will pick up the sign-in sheet for public comment time and before we leave in the evening we will also provide public comment time.

I believe we were ready for IPANM to present its case. Ms. Foster?

MS. FOSTER: Thank you, Madam Commissioner. I believe I deferred the opening statement at the beginning of the case and deferred

it to the opening of my case. I have a witness ready to go today but I would like to make a brief opening statement in that's okay.

CHAIRPERSON BAILEY: Please do.

MS. FOSTER: Thank you. May it please the Commission. I am here today on behalf of the Independent Petroleum Association of New Mexico. IPANM is a nonprofit organization that serves as the voice of the independent oil and gas producers of New Mexico. Our member companies employ nearly 26,000 New Mexicans. We raise our families in New Mexico and pride ourselves on being strong leaders in our community.

Why are we asking for changes to Rule 17 or the Pit Rule? We are small operators. We have no additional staffs. We have tight budgets and even tighter time frames. We also rely on relationships with investors to try to get wells drilled. We are very sensitive to additional costs and additional regulatory burdens. We need a rule that is easy to understand and to implement and that holds all parties accountable. The rule should not allow for speculation or misinterpretations by operators or regulators. We do need set time frames and we need a comparable regulatory scheme to other

states. As you know, the Permian Basin borders on Texas, so Texas regulations are very important to us in terms of a level playing field and the same thing with Colorado.

To understand, the cost question and energy production New Mexico is important to understand; therefore, IPANM has produced three exhibits as part of our packet for just background information. Specifically, Exhibit 2, which is the Energy News infozine that we create every two years, the Independent Petroleum Association does, and we also provided you some congressional statistics on production in New Mexico just to give you an idea of where New Mexico fits into the national picture.

We will also have Mr. Larry Scott testify specifically as to the economics of New Mexico in comparison to Texas economics and that of other states and drilling in other states.

The Independent Petroleum Association's petition proposes to change Rule 17, and our changes are based on science, are protective of human health and affords reasonable protection to freshwater as designated by the State Engineer and the environment. Looking at statutory requirements of the OCD, which I think is really important in this

case, the statutory requirement of the OCD is for the conservation of oil and gas. It is to prevent waste and to protect correlative rights. There are also enumerated rights concerning the disposition of produced water in a manner that will afford reasonable protection against contamination and water that is designated by the State Engineer.

Our concerns specifically relate to the use of closed-loop systems. The basic question will be raised, what is a closed-loop system? Is it solids control equipment or is it a tank used for a workover? IPANM believes closed-loop systems are temporary tools and, therefore, need to have engineering specifications, but that the OCD regulatory staff, because it's a temporary tool, need not be concerned about what we use in a closed-loop system, they need to be concerned about the final disposition of our cuttings as opposed to how the cuttings get there.

The Independent Petroleum testimony will discuss the practical and business impacts of regulatory requirements to use closed-loop systems and suggest that the use of closed-loop systems is a business decision by operators and a temporary tool.

We are also concerned about testing

requirements when completing a burial on-site when depth to groundwater is greater than 100 feet. Our modeling by Mr. Mullins will demonstrate that there's very little migration of chlorides from the contents in the buried pit. We will go through that in-depth.

We are also are concerned and we suggest that no liner is required on top of a pit or burial in place as in Texas. We would like to have a comparable regulation to Texas. We need regulatory certainty when it comes to air drilling and cavitation of wells. We are concerned about the wet or discolored soils requirements that the OCD seems to be looking for and we will discuss that. We are concerned about the recording of on-site burials with the county staff and believe that the information provided to the OCD is adequate.

Finally, we will discuss in depth the variance issue. The IPANM witnesses will testify we need certainty, accountability and transparency. We need certain time frames because OCD staff, who will be overwhelmed with applications, particularly when the price of oil is high and when the price of natural gas hopefully will come up and more drilling will occur in New Mexico, we want to work with staff

to get the permit applications and to get variances required but we don't want to put additional burdens on staff and, of course, we have no staff as small operators. So we need, again, to have transparency and accountability.

The proposal that IPANM is asking for asks for administrative approvals when OCD staff does not approve and this will encourage communication. Our concern about the additional requirements of protection to livestock and establishing public safety standards, we do not believe that is part of the OCD statutory requirements and we will discuss that as well as the notification to surface owners requirement that is a new requirement.

We urge you to listen to the testimony and we are confident you will adhere to your statutory duties in the balance of the standard of prevention of waste as a natural resource with the responsibilities to protect public health and the environment and to accept our recommendations. And I am ready for my first witness at this time.

CHAIRPERSON BAILEY: Please stand to be sworn.

THOMAS MULLINS

after having been first duly sworn under oath,

was questioned and testified as follows:

DIRECT EXAMINATION

BY MS. FOSTER

Q. Good morning, Mr. Mullins.

A. Good morning.

Q. If you could please state your name for the record.

A. My full name is Thomas E. Mullins. I go by Tom.

Q. If you could please describe your educational experience for the Commission.

A. Well, my current -- my background is a petroleum engineer and I went to college at the Colorado School of Mines, obtained my bachelor's degree in petroleum engineering in that discipline.

I'm currently the engineering manager for Synergy Operating and also the president of my own company, Mullins Energy, Inc., which is a consultant company. And I have been working in the oil and gas industry for 20 years.

Following graduation from the Colorado School of Mines I moved to Farmington. I went to work for Meridian Oil at that time which became Burlington Resources. I worked for them for a total of five years. Following that time period I started

my own company, Mullins Energy, Inc. and Synergy Operating, LLC which is an independent producer, and I have been working for that company since then so I think I am coming up on 16 years -- 15 or 16 years.

I've worked throughout the Rocky Mountain region, principally Wyoming, Utah, Colorado and New Mexico. The majority of my experience operationally has been in the San Juan Basin in particular.

Q. Thank you. Do you have any professional affiliations?

A. Yes. I'm actually a registered professional engineer in the state of New Mexico licensed in the state in the discipline of petroleum engineering. I'm a member of the Society of Petroleum Engineers, the Four Corners Geological Society, which is affiliated with the AAPG where I am an associate member, and I am a member of IPANM and NMOGA.

Q. Now, relating to your petroleum engineer designation, what studies and qualifications or examinations did you have to go through to hold this title?

A. To obtain a professional engineering license and certification you have to first pass the engineering training examination. You typically do

that hopefully right after your schooling. That's an examination you have to pass and you have to practice in the engineering field for at least five years, obtain recommendations and sit for a professional engineering examination in the discipline that you are going to be practicing, and I sat for that examination -- I can't remember the number of years ago. It's quite a few. And I passed that and it's in petroleum engineering.

Q. As a petroleum engineer, what specifically do you concentrate your efforts on?

A. Petroleum engineering is the subject of drilling oil and gas wells as well as studying the flow of fluids through porous media -- oil, natural gas, water. That pretty much sums that up.

Q. And do you study economic aspects of oil and gas development?

A. Yes. Petroleum engineering, we specifically evaluate the economics associated with different development practices in the oil and gas industry, drilling wells, preparing AFEs, which are authorities for expenditures, as well as analyzing the cost of regulations and the impacts.

Q. What does it mean when someone adds the designation or signs the document as a petroleum

engineer?

A. As a professional engineer, as a PE, that designation means you are -- I guess comparing to other witnesses' testimony, it should give the regulatory bodies more certainty that that person is qualified to testify in that particular subject matter. I think that's the main point.

Q. And you mentioned that you were a member of IPANM?

A. Yes.

Q. Have you held any executive positions with IPANM?

A. I have been the Northwest New Mexico vice president and then was the president of IPANM for approximately three months before resigning that spot.

Q. Have you ever held a political office?

A. No, I have not.

Q. Did you testify at the 2007 or 2009 hearings?

A. I testified at the 2007 Pit Rule hearing. I was on the stand for approximately nine hours.

Q. And were your credentials accepted by the Oil Commission when you testified at the 2007 hearing?

A. Yes.

Q. Have your credentials changed since 2007 when you were accepted as an expert?

A. Other than an additional five years of experience, they have not.

Q. So among your other areas of expertise as a petroleum engineer, do you have specific knowledge and experience in studying the movement of fluids and gases through rock formations?

A. Yes.

Q. Looking at IPANM Exhibit 5, is that a copy of your resume?

A. Yes, it is.

Q. Was that prepared by you and does that accurately represent your qualifications and experience?

A. Yes, it does.

MS. FOSTER: At this time I ask to qualify Mr. Mullins as an expert in the area of the movement of fluids and gases through rock formations as a petroleum engineer.

CHAIRPERSON BAILEY: So qualified.

MR. JANTZ: I would like to question the witness before he is qualified.

CHAIRPERSON BAILEY: All right.

VOIR DIRE EXAMINATION

BY MR. JANTZ

Q. Good morning.

A. Good morning.

Q. Back in 2007 when we were in the Pit Rule hearing, we talked about your qualifications then. I would like to talk a little bit more about them today. At that point -- well, let me back up. Your testimony today is about your models on pollution transport and fade; is that right?

A. That's correct. I did the modeling basically duplicating all the modeling that was completed in 2007 by the OCD, 2009 by the OCD and then I performed my own modeling.

Q. And that's held in Multimed; is that right?

A. That's correct.

Q. Back in 2007, you will recall the modeling experience you testified that you had was in preparation for that hearing. That was the extent of the experience you had with the HELP and Multimed modeling?

A. I believe that's correct, yes.

Q. Has that changed the second time around?

A. Well, I've have a significant amount of

experience by running -- repeating all the models and running a number of different sensitivities specifically related to the burial of drill cuttings in New Mexico.

Q. Let me ask you this way. Have you done any additional modeling with HELP and Multimed other than preparing for this hearing?

A. No, I have not.

Q. So it's just the two times that you have run the HELP and Multimed medium?

A. I repeated the 2007 modeling, the 2009 modeling and then prepared my own modeling, so the total number of runs would be several hundred different sensitivity cases.

Q. But for the purposes of just preparing for these two hearings; is that correct?

A. That's correct.

Q. Are you a hydrologist?

A. No.

Q. You are not a hydrologist? Okay. Do you have experience in toxicology, epidemiology, any sort of public health background?

A. I do not.

MR. JANTZ: I do object to the witness on the same grounds I objected to him in 2007 and to

the extent that he is not qualified as a hydrologist nor is he qualified to testify about the HELP and Multimed models based on inexperience.

MS. FOSTER: I believe that Mr. Mullins testified that as a petroleum engineer during his experience and education, that that's part of his education is learning about modeling. Maybe Mr. Mullins would like to talk more about how in his education as a professional engineer and as a petroleum engineer this is part of his responsibility at a well location. Would that be possible for him to respond to that?

CHAIRPERSON BAILEY: If you would elaborate.

THE WITNESS: Well, I guess in response to that, petroleum engineering is modeling basically of -- that's the business. We model the production and modeling of oil, natural gas. Specifically because of the regulations associated with the Pit Rule that were put in place and the reliance upon the HELP model and the Multimed model by the OCD, I, I guess, engrossed myself in those two particular models in particular to become very familiar with them, their input parameters, the sensitivity items.

I have done modeling since I was in

college with regard to oil and gas production. I do that daily and I think I'm capable of discussing my modeling that I prepared. If Mr. Jantz has questions about my modeling, I would be happy to answer them.

CHAIRPERSON BAILEY: Commissioner Balch, do you accept Mr. Mullins?

COMMISSIONER BALCH: Actually, I have no problems with his qualifications in that regard for using modeling software. The most important thing is understanding the mechanisms and the variables that were used rather than specific software.

CHAIRPERSON BAILEY: Commissioner Bloom, do you have any objections?

COMMISSIONER BLOOM: We are hearing testimony on hydrology. I think we have a number of good hydrologists in the state and region that would have been appropriate to bring forward but I would like to hear Mr. Mullins' testimony and questioning as appropriate on the model and how it was done.

CHAIRPERSON BAILEY: Mr. Mullins is accepted as a witness for IPANM.

MS. FOSTER: Thank you.

DIRECT EXAMINATION CONTINUED

Q. Mr. Mullins, we are here today to discuss

Rule 17 commonly known as the Pit Rule. Are you familiar with that existing provision in the New Mexico regulations?

A. Yes.

Q. Are you familiar with the predecessor to Rule 17, Rule 50?

A. Yes, I am.

Q. Now, did you operate actually as an oil and gas producer under Rule 50?

A. Yes.

Q. Now, for Commissioners Bloom and Balch who were not present for the prior hearing and may not be familiar with Rule 50, can you give us a thumbnail quickly as relates to this hearing, the issues that are important?

A. I guess the short version, Rule 50 was the rule put in place in 2005. The focus at that time was primarily the below-grade tank area. That was put in place and the industry was working well under Rule 50.

To jump to some of the -- I guess Rule 50, I believe, is an adequate rule that protects freshwater, human health and the environment. It was quite easy to work under, I think, from a regulatory standpoint, and from an enforcement

standard it allowed the tools to be put in place by the OCD to enforce tears in liners, remediation plans, those sorts of things.

I testified previously that I thought Rule 50 was adequate but we are here dealing with Rule 17, so I have experience in both of them.

Q. Thank you. Have you listened to the testimony provided by other parties to this hearing?

A. Yes.

Q. In preparation for this hearing did you participate in the preparation of our petition, the IPANM petition which is before the Oil Conservation Commission at this time?

A. Yes.

Q. Did you work with any members of NMOGA?

A. Yes, the IPANM team consisted of Larry Scott, Jeff Harvard, myself and Paul Thompson as the alternate and then the NMOGA team was Lisa Winn, Jerry Fanning, Vicki Sanchez and Bruce Gantner.

Q. What was the outcome of your work with the IPANM pit team and the NMOGA group on amending Rule 17?

A. We came forward with the initial filing of the rule that both IPANM and NMOGA agreed to the provisions, and that's what we submitted.

Q. That was in October of last year?
A. That's correct. I believe the only difference in that submittal was the Otero Mesa portion, which has subsequently been removed.
Q. And the IPANM board, did they appoint you to that Pit Rule group?
A. Yes, they did.
Q. Did they ask you to testify today?
A. Yes, they did.
Q. Did you actually work on the language presented in the NMOGA petition as a member of the IPANM and NMOGA work group?
A. Yes.
Q. Prior to NMOGA's submittal of petitions and exhibits did you talk to or consult with the witnesses about their planned testimony?
A. No, I did not.
Q. Did you see any of the exhibits presented by NMOGA witnesses prior to their filing it with the OCC on May 4?
A. I did not see a single NMOGA exhibit prior to its filing.
Q. In preparation for your testimony for the hearings did you review the OCD 2007 computer modeling and the industry modeling?

A. Yes, in detail, and duplicated all of the modeling.

Q. All right. Now, relating to the 2007 hearing, I think you stated you strongly oppose the adoption of Rule 17?

A. That's correct.

Q. What was the basis of your opposition to the adoption of Rule 17?

A. I believed it was unnecessary for the protection of human health and the environment. The modeling that was done indicated it was going to be potentially thousands of years, based upon the modeling results at that time, for a contaminant that might possibly migrate below a temporary reserve pit with cuttings buried in place and numerous reasons which we will probably get into in the modeling, but the only migration point that was done and the studies that were done were in the vertical direction, basically the movement of will whether it was 50 feet or 100 feet down, and there was no discussion about the lateral movement of a potential contaminant to a receptor, someone's water well, a house, those sorts of things. And there are numerous adjustments in relation to the modeling. When you get down to it, I viewed the Rule 17 as

being an unnecessary rule. I was concerned that it would impact workover operations, and subsequently I think that came into place. The focus was burial of drill cuttings and now we are into regulation of workovers and whether you are using tanks out there and is it hydraulic fracturing fluids and what's in the tanks and it's expanded beyond where it should be in my mind.

Q. Under Rule 50 how long was the APD application as compared to what's under Rule 17?

A. Thank you. The APD application, when you file an APD it includes a plat of where your wellhead location is and where your pit location is on the plat so that information was already present.

So with regard to the new Pit Rule application, when I fill mine out they take at least 26 pages for the application form, and that's for the submittal of the pit portion. So it's a significant amount of paperwork under the rule filing right now, where basically the information was already available under current operating practice.

There aren't these unknown locations of pits around New Mexico. They are all specifically designated and have been for as long as I have been

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working.

Q. And did you previously testify that Rule 17 would add costs associated with operations?

A. Yes, I did, and I believe it has.

Q. Prior to completing your modeling for the hearing did you review the 2009 OCD modeling for possible contaminant migration?

A. Yes, I did.

Q. And you are familiar with the modeling?

A. Yes, I am.

Q. Why did you find it necessary to review both the 2007 and the 2009 OCD modeling prior to your modeling for this case?

A. I believe it was appropriate for the commission and I guess the industry to try to focus on the same modeling that has been utilized for Rule 17 that's currently in place rather than bring in an additional model and represent that. So I thought for consistency's sake it would be good to review what modeling has been done in the past and present modeling with realistic parameters as well as including that same model but now taking the lateral movement of a potential contaminant from directly underneath the reserve pit to a potential receptor which might be 100 feet laterally under the most

stringent criteria we have.

Q. Before we get into your PowerPoint presentation, if you could please look at IPANM Exhibit 2. What is it and why was it part of the IPANM submission?

A. I believe Exhibit No. 2 is the IPANM Energy New Mexico informational magazine. I was involved in the preparation and production of this. It has some background information, including a section on the Pit Rule, but it's more to just give some background information on the importance of oil and gas to the state of New Mexico.

Q. Looking at IPANM Exhibit No. 3, did you prepare this exhibit?

A. I did not prepare Exhibit No. 3. Exhibit 3 was part of the overall IPANM submittal but it comes from the website from the Department of Energy's Energy Information Administration. It contains some additional oil and gas information. Previously in the hearing there was a discussion about natural gas prices. I believe this is where the Citygate natural gas price was referenced in some of the economic testimony.

Q. And what is IPANM Exhibit No. 4?

A. Exhibit No. 4 is actually some interesting

information from August of 2011 from nationally the IPAA, which I am also a member of, the Independent Petroleum Association of America. And it lists the state rankings on oil and natural gas production.

Looking at the first page of this exhibit, the second -- excuse me, the third column indicates the crude oil production and ranks New Mexico currently as the eighth largest crude oil producer out of the 50 states. The fourth column lists New Mexico as the seventh largest natural gas producer in the United States and this is as of August 2011.

Many people may recall that New Mexico is continuing to drop in the rankings nationally on production because some other areas are seeing quite a bit more activity.

The second page is some interesting information regarding federal congressional districts and the importance of natural gas and crude oil production. The second page covers crude oil production. It's interesting to note that New Mexico's second congressional district is the fifth largest congressional district with regard to crude oil production in the United States, and I think the further down the list, the third congressional district which would cover Northern and Eastern New

Mexico, which was the area that I was working to represent when I campaigned for Congress is 34. Especially with regard to natural gas production, the third congressional district on the third page is actually the third largest natural gas producing congressional district in the United States and the New Mexico second congressional district is the 19th largest natural gas producing congressional district in the United States.

The reason that these are before the commission is to indicate the importance, not just from a state perspective but nationally with regard to oil and gas production.

Q. You stated that the Independent Petroleum Association's Board of Directors asked you to complete computer modeling for this case and to testify. Why did they ask you specifically for modeling? NMOGA did not do any modeling in their case.

A. IPANM's board and technical committee believed that the science should support as well as the factual and the historical information. We believe that presenting computer modeling and specifically utilizing the same models that the commission, the Oil Conservation Commission and the

public may already be familiar with was the appropriate tool to present to the commission to consider for your ruling.

Q. Were you present for Dan Arthur's modeling?

A. Yes, I was.

Q. Did Mr. Arthur perform any computer modeling specifically relating to contaminant movement below temporary reserve pits for this hearing?

A. I don't believe Mr. Arthur presented any. I believe he commented in his written report that he had reviewed Daniel B. Stephens' testimony and presentation in 2007 and he wrote in his report that he concurred with Daniel B. Stephens' work.

Q. Now, you mentioned in preparing your modeling you've looked at historical data of pits. In Mr. Arthur's testimony he actually mentioned the same thing, specifically NMOGA Exhibit 14, Slide 4. Do you recall that testimony concerning historic pits in New Mexico?

A. Yes, I do.

Q. And have you reviewed the case files that he claimed were alleged contamination cases?

A. Yes. Just to briefly summarize that

slide, and in particular that portion of his testimony was in reference to a term he used 500 alleged cases of groundwater contamination. I have been involved in the Pit Rule discussion since sometime in the 2006 time frame, and myself and a number of other engineers reviewed the case files on the alleged cases of groundwater contamination. There were not 500 cases, there were 421 cases. Not a single one, to my knowledge, based upon my review and the review of detail, was a case of groundwater contamination. They were cases of soil contamination and they dealt primarily with earthen production pits, which were long-term storage and effectively disposal of produced water. They were not temporary lined reserve pits, which was the primary focus of the 2007 rule. As we recall, Rule 50, which was the predecessor rule, primarily dealt with the below-grade tanks to try to remove any earthen production pits at that time.

Q. So you believe Mr. Arthur's testimony and exhibits might overestimate the possible instances of groundwater contamination that have or might have impacted groundwater from a historical mathematical perspective?

A. Absolutely. I believe his numbers are

high. I'm not aware of a single case of groundwater contamination from an oil and gas temporary reserve pit. I'm familiar with ten cases that were understand examination in 2007. They were all located in the Southeast New Mexico, and to my knowledge, none of those cases indicated a contamination of the groundwater above any sort of background sampling. There were instances of soil contamination but there was not a single case of water contamination that I'm aware of.

Q. So just to clarify for the commission, do you mean to imply that there's never been a spill, release or direct impact by the industry to freshwater or groundwater resources?

A. Absolutely not. That has occurred, but with regard to temporary lined reserve pits used in the oil and gas industry, I'm not aware of any.

Q. Did you review the testimony of OCD witnesses Mr. Michael Bratcher and Mr. Brandon Powell from the prior 2007 hearing regarding instances of groundwater contamination from temporary drilling pits?

A. Yes.

Q. Did they report at that time in 2007 identifying a single case of groundwater

contamination related to temporary drilling pits?

A. They both testified there were none to their knowledge.

Q. Turning your attention to Exhibit 6, did you prepare this for the commission?

A. Yes, I did.

Q. What is it?

A. Exhibit 6 is a PowerPoint presentation which is a summary of my commuter modeling that IPANM asked me to put together for presentation to the commission.

Q. Did you prepare this exhibit?

A. Yes, I did.

MS. FOSTER: I would move this exhibit for the purposes of presentation at this time. I will move all my exhibits at the end of his testimony into the record but at this time I didn't know if I needed to move it in for presentation purposes.

CHAIRPERSON BAILEY: Any objection?

MR. JANTZ: Just for clarification, you are moving this in for demonstrative purposes or as part of the record?

MS. FOSTER: So we can look at it, and at the end of the testimony I will move all of the exhibits in for the record.

MR. JANTZ: No objection to a demonstrative exhibit.

MR. DANGLER: No objection.

MS. GERHOLT: No objection.

DR. NEEPER: No objection.

CHAIRPERSON BAILEY: So admitted. Before you begin, Theresa, will you shut down the outer audio/visual? We have plenty of seats and we don't need to be broadcasting to the wall. Thank you.

Q. Please proceed with your explanation of Exhibit 6 utilized for the commission.

A. Thank you. Members of the commission, I want to briefly talk about what I did with regard to reviewing the modeling that was performed. I obtained the Oil Conservation Division's setup file, the information for both the HELP model and the Multimed model from Mr. Ed Hanson who E-mailed me that. The reason that I wanted to, rather than just comment on prior modeling, I think it's appropriate that you duplicate the modeling that has been done or represented so you have a good understanding of the parameters and what the inputs are, because a good portion of any sort of modeling is the understanding of the inputs and their sensitivity and what they mean. So I did that because I wanted

to understand in detail what had been done, what had been relied upon by the commission in prior hearings, and to be able to explain the differences, should the commission have any questions between my modeling and the modeling that had been done previously that the commission relied upon.

Q. Mr. Mullins, to interrupt you, the modeling done in 2007 and 2009, that was considered by the old Conservation Commission at that time in the passage of Rule 17; is that correct?

A. That's correct.

Q. So it would have been accepted as appropriate modeling to establish the policy behind Rule 17?

A. I believe that's what it was used for, yes.

Q. Thank you. Moving to slide 2.

A. Slide No. 2 of Exhibit 6 -- and I know there's been some discussion of risk and it's titled Risk Assessment. I believe it's appropriate for regulatory bodies and decision-makers to understand the risk, and I think what we are looking at here in this instance is the risk to freshwater resources, human health and the environment.

So that's the standpoint from where I

think we need to look at it with regard to the burial of drill cuttings, which is what we are talking about, and any residue materials that are associated with oil and gas.

The first sentence here indicates that saturated flow of water is different from unsaturated flow. The focus of the modeling that was done and the discussion that Dr. Neeper had was also focusing on unsaturated flow. Saturated flow of water or hydrocarbons is a different animal from the unsaturated flow. That's basically what we are looking at is the vadose zone area which is the area above the groundwater, for instance.

So we have the surface area. Then we have the section of soil that's above a groundwater reservoir, so we are looking at that dry soil. We're not talking about right along the river bank where the soil could become fully saturated and analyzing the flow.

Q. Does that mean your unsaturated flow modeling has a hydraulic head on it or not?

A. Correct, it does not have a hydraulic head on it. I'm sure we will get into discussions of liner quality and different things like that, which will be a little different from what I am presenting

here. I am talking about the long-term storage of cuttings and the movement of water through those cuttings that might move contaminants.

So what I did, the second item indicates I utilized similar assumptions and conservative modeling parameters used by the Oil Conservation Division in 2007 and 2009 here. What I mean by that is I didn't tweak any of the soil characteristics. I didn't change the liner quality or style. I basically tried to keep everything that was on the conceptual model, the input parameters, the same. I made a few adjustments but we will go through those in detail, but I didn't want to get into the concern or people may have concern that I changed the soil characteristics so it would slow down the movement of a potential contaminant. I didn't do that. I didn't change any parameters.

An important concept that I want to talk about, and its presence is actually listed in the ConocoPhillips report from Dr. Buchanan. It's important because it talks about the salt bulge. The salt bulge is actually the natural salt profile in the soil, and what you see in the -- obviously, I defer to Dr. Buchanan's greater experience in that, but what you see is a depth where you have higher

salt concentrations, anywhere from four to seven feet down below the soil. What that means is that's where the salt deposited. Above that level, the actual movement of water, not of the contaminant, but of the water was up primarily.

So what that indicates is in most of New Mexico there has not been a lot of movement through the unsaturated portion of the soil for 10,000 to 16,000 years, based upon those salt bulges in the natural profile. I'm not talking about the profile that would be with the contaminant already in place. That's just the natural movement.

Geologically, the discussion on that primarily relates to the last time glaciers -- when we were covered by ice is effectively when that was.

The next bullet point that I have indicates infiltration rates, and that's an important topic and probably the primary item of concern with regard to how water or a potential contaminant could move.

Walvoord and Scanlon in 2004 is one of the primary references. It was in Dr. Daniel B. Stephens' testimony in 2007, but it indicates that your infiltration rate could be as low as .03 to .01 millimeters per year. Basically, that would be the

movement. So when you factor in the 10,000 to 16,000 years and the depth of the soil profile, those kind of all correlate.

The reason that's important is I wanted to see where my results came out in my modeling, also compare that with the results that the OCD had in their modeling and see where this falls in place.

What I included in the model that's different for our hearing today in 2012 from the prior modeling in 2007/2009 is the horizontal movement. In addition to the contaminant moving vertically, moving the contaminant horizontally, 100 feet to a potential person's well at their house or a stream bed or something to that effect.

Q. Why did you use the 100-foot marker?

A. I used the 100-foot marker because it was the most stringent criteria that the industry was recommending for siting requirements in place. That's why I used that. I could have picked any number, but I used 100 feet.

The Oil Conservation Division technically uses three feet because they use one meter in their model so it wasn't directly underneath the pit but in order to have a number in the model to make it work they use one meter, so a little over three

feet.

Q. And what does that mean conceptually? It means that you have to be directly underneath the pit? If you have vertical contamination down to the groundwater you have to be directly under the pit?

A. The results that were presented in 2007 and 2009 were basically going underneath the pit and measuring that point right there at that point and then comparing that to drinking water quality standards. And I didn't believe that, from a risk assessment standpoint, likely for the public anyone to encounter, you know, that at that point. I mean, they were going to encounter it either at their water well or the nearest closest horizontal distance.

Q. Mr. Mullins, shouldn't the commission be concerned about the degradation standard; in other words, when there is any contaminant that hits groundwater for the purposes of this rule?

A. No, I don't believe so. We have asphalt out here on the pavement and the rainwater hits the asphalt and runs off and we are not writing additional regulations to control that.

Q. So pertaining to your risk assessment comment, the rule that we are looking for is not a

complete non-degradation standard, correct?

A. That's correct. It's not saying that the salt is not going to move. It's going to move. It's just going to move at such a slow rate and at such a very small concentration that it does not pose risk to human health or the environment.

Q. Thank you. Your last point concerning flux, please?

A. Something that's important to note, and there was discussion previously about reaching equilibrium. Dr. Neeper had that discussion. It's effectively why we have a salt bulge in the natural soil profile is you can reach equilibrium. The HELP model, in particular, which is the portion that drives the upper part of the conceptual model, it will not allow you to have total upward movement or negative flux in the model. It will always drive the resultant going down. So the instances -- you can have instances where, as I believe Dr. Buchanan testified, you reach some sort of equilibrium. The model isn't going to allow that equilibrium to occur. The model is actually going to move it down. It will not just sit there for 200,000 years and not move. It will move it.

Q. According to the modeling?

A. According to the modeling and the equations and set parameters within the modeling.

Q. Looking at Slide No. 3 concerning the actual modeling?

A. The third slide of Exhibit 6 is a brief overview of the predictive models that have been used previously in discussion of the Pit Rule. There were two models that were used, the HELP, which stands for the Hydrologic Evaluation of Landfill Performance model that was prepared by the Army Corps of Engineers for the EPA. And it's what's called a water balance model. Just to briefly reference with Dr. Neeper's model, it did not include that basically upper portion. He had an upper boundary condition.

The HELP model which was utilized by myself and the Oil Conservation Division takes into account what's going on on the surface physically. It's counting storage, which means do you have a little pond there? Do you have snow melt that's freezing during certain times of the year? It handles runoff at the surface because not every drop of water is going to go directly down through the soil. It can run sideways. It handles evapotranspiration, which is the movement of water

out of vegetation. It handles evaporation. It handles vegetative growth. It handles the different amount of soil moisture that can be stored. It's capable of handling lateral subsurface drainage, so if you have an additional layer, a clay layer or something below the surface, it can move things laterally.

It models unsaturated vertical drainage. It handles leakage through soil, geomembranes, geomembrane liners, leaks through liners. It handles all that sort of thing and it's been used by many states in the United States and specifically within the industry and most recently, obviously, was part of the 2007/2009 hearing that it was relied upon.

The second portion of the model -- so running that HELP model you get an output from the model and the output is the infiltration rate, which is an important item that I discussed. You take the infiltration rate and you put it into the second portion of the model, which is a two-dimensional EPA model called Multimed. Effectively at the 2007 and 2009 hearings, the Oil Conservation Division only used one dimension of that two-dimensional model. They used the vertical portion. Basically what

would move from underneath the reserve pit down to the top of the groundwater. They did not model the additional 100-foot lateral distance which was capable of being modeled in the Multimed model but it was never presented to the commission from a risk assessment standpoint in either 2007 or 2009.

Its principal use is for vadose zone movement, which is below the bottom of the temporary pit down to the aquifer, and then it will model the contaminant movement in the aquifer laterally. Its importance is you can determine the concentration of the contaminant. Dr. Neeper's model did not measure concentration, which I believe is an important item for concern to the commission. It's not that the contaminant is not going to move, it's the concentration of the contaminant that will arrive or potentially arrive at the receptor. So this model is capable of determining the concentration and how it moves over time through the aquifer.

Q. Thank you. Moving to Slide 4.

A. Slide 4 is probably the busiest slide that I have for the commission. I put it up on the screen. This is effectively the conceptual model, and I've tried to include all of the HELP and Multimed modeling conceptually on this one slide,

and it lists 2007, 2009, 2012. You're going to see a slide that shows the current modeling. That will just be 2012.

In summary, the sun indicates that we obviously have sun. The cloud indicates that we are going to have rain. The arrows pointing down indicate that the rain comes down. The little grasses that I have growing are the vegetation and/or lack of vegetation.

Q. So the sun means that you are concerned about solar input at various locations in New Mexico in your modeling?

A. That's correct. You are concerned about solar as well as temperature data, soil temperatures, moistures, humidity.

Q. Do you concern yourself with climatology as well, precipitation?

A. Yes, you concern yourself. That's one of the principal drivers, obviously, is how much moisture is put into the model. On the left-hand side is the vertical representation. I want to note that this is a conceptual drawing. It's not drawn to scale. But on the left-hand side of the graph, the top portion is the cover material and the modeling that had been done today was either two

feet of cover material or four feet of cover material that was put in place. Of course, since the Pit Rule was put in place the standard has been four foot of cover. The industry is not recommending any changes to that, but I think it's important to note when you look at past representations that were done that you understand that it was a potentially different amount of soil cover on the surface, which has different effects.

We move from the two or four foot of surface cover to 12 1/2 feet, which is the vertical representation of the waste, and that was consistent in the models in all three hearings. The portion below that, 50 feet or 100 feet, is basically where the focus was at prior hearings. Fifty feet was the primary focus in 2007. The modeling that was done both by OCD and industry, the overall focus was really at the 50-foot depth. There were presentations up to 350 feet of depth and even down to 25 feet and there might have even been one at ten, but conceptually for the purpose of where the regulation was, 2007's regulation was 50 feet; 2009's regulation, the amendment to the Pit Rule, focused on the 100-foot depth. So that's the reason that that's there. The aquifer under all situations

was modeled as being 63 feet in height.

Moving to the next column, there were some soil types effectively that were used. I have loam or sandy loam, just a descriptor, drill cuttings and waste and then the vadose zone, which was consistent, sandy loam. And then you reach down to what's called the mixing zone of the aquifer. On all of the modeling, 2007, 2009, 2012, there have only been two different depth changes of the mixing zone. Four inches was used in 2007, so all of the modeling that was done in 2007 was based upon four inches of mixing zone. That's a very important area and we will get into some discussion on that.

The 2009 modeling that was done by the OCD used ten feet. I also used ten feet in my modeling in 2012. You could argue that it should be the entire 63 feet could be an effective mixing zone depth, but I stuck with what they used in 2009 and I am happy to answer questions on why I did that.

Up at the upper right-hand portion there's a very important comment there. It says "20 inches or 48 inches of evaporative zone." This is the principal -- one of the principal differences in the modeling is the evaporative zone depth in the modeling.

For vegetation to be put in place, in the modeling that was done by the OCD and just conceptually, the top six inches was considered to be a root zone depth. That is different from the evaporative zone depth. The evaporative zone depth is basically the upper portion of the soil where the water movement could go up. We just recently discussed the salt bulge and where the salt bulge is. Effectively, you could go to everywhere in the salt profile and find the point above the salt bulge and say that's the specific evaporative zone depth or basically where the water has been moving up at that specific point.

The Oil Conservation Division in both 2007 and 2009 used a 20-inch evaporative zone depth. I used 48 inches of evaporative zone depth in my modeling. The reason I used 48 inches is because I am effectively limited by the amount of soil cover that we put on top of the pit. So 48 inches is the equivalent of four feet. The way the model functions, it will actually not allow me to make a deeper evaporative zone depth than my material above the waste.

We are going to get into some discussion on why I relied upon the 48 inches rather than the

20 inches for evaporative zone depth, but it's the critical parameter. But conceptually that's different from a root zone depth. Dr. Buchanan talked about root zone depths, shrubs and things that could even go down into the pit waste. He is right. That could also be concerned with an evaporative zone depth. But the true evaporative zone depth is actually deeper than the root zone depth that's in place.

The horizontal distance I have in the lower right-hand portion of the graph, I mentioned in 2007 and 2009 the Oil Conservation Division used three feet of lateral movement so basically they are measuring right underneath the pit waste. I used the 100-foot distance, which would be the closest distance to the receptor. Then the black lettering says -- the top portion of the model has a HELP input, and what comes out of the bottom of the drilling cuttings or the waste, that is the HELP output which then becomes the Multimed input which then goes into the second portion of the model.

What the slide is trying to do is put all the modeling and all of the discussion briefly on one slide for discussion. We can get into all of the details and parameters of all of the runs and

I'm happy to do that. But I thought this would give everyone at least a simplistic representation of the differences in the modeling.

Q. Thank you. Slide No. 5 talks about the HELP model and the model input parameters?

A. Yes, that's correct. Slide No. 5 deals with what can you put into the HELP model. This has quite a bit of capability but it handles daily values. This is the important thing. Because as we all know in New Mexico, one day it could be sunny and the next day you could have a torrential downpour. So the water input is not consistent. It doesn't just come in at the same level. It has a extreme degree of variability based on the time of year and a number of different things. So the HELP model handles all of those various inputs.

Actually, you input a set average wind speed. It doesn't change the wind speed every day. I'm sure it's capable of doing that and some of the newer models are probably capable of doing that, but this version has one wind speed. It uses daily temperature data, and humidity data is actually based on a quarterly basis. It uses daily solar radiation indexes based on -- kind of goes with some of the temperature data, and uses daily evaporation

indexes, so it creates basically a daily dataset to work from. That's consistent with what Dr. Neeper utilized in his modeling based upon a Julian calendar year, which is 360 days.

So there's weather data and that's one portion of the input. You also have soil data inputs, which include the number of layers you are going to model, the type of layer material, the layer thickness, the soil types in particular that they are using, and these are some of the other parameters that you can adjust: Soil porosity, field capacity, wilting point, initial soil moisture.

The initial soil moisture is an important item if we are referencing Dr. Neeper's testimony on how he stabilized his model. The way I understood his model was that he had a groundwater aquifer underneath it and then he ran it to obtain the initial soil moisture effectively coming from below. And I'm sure he will correct me on that. But in this particular model, you can input initial soil moisture contents or it can be calculated. I stuck with the same parameters basically that have been used in the majority of these items by the Oil Conservation Division in the prior modeling. We can

get into why you would select one or the other.

Type of cover material. This gets into the discussion of whether you put a liner on top of the pit. If there's plants, you know, the vegetative quality on top of the area. The slope of the cover material. We currently -- we try not to have a bowl. We like to have some sort of slope on the surface for surface water to move, and the important parameter that I mentioned, the evaporative zone depth, which is how deeply down, basically, will the water move. Those are the principal parameters for the HELP model.

Going to the next slide, Slide 6 of the Multimed model, which basically takes the output of the HELP model, which we will see here in a second, and then you have these additional parameters that go into the Multimed model. You have the thickness of the vadose zone, the saturated hydraulic conductivity, the effective permeability through the vadose zone. You have an effective porosity, and the reason the effective porosity is important is it's different from total porosity. Total porosity is a larger figure than effective porosity. You may have certain portions of the space that nothing moves through, but the effective porosity is the

accessible porosity.

Residual water content in the soil, dispersivity, longitudinal dispersivity. What we're getting into now is that now that we are coming down in our model conceptually below the pit, you could very easily expand the flow radially or in an ellipse or in some particular pattern that would come out the bottom of the pit. In all of the modeling done that was by both the Oil Conservation Division and myself, we limit that. We don't allow, I guess, an X/Y elliptical, radial, any sort of movement. We take it in a straight beeline pattern. It comes out the bottom of the pit and then there's a receptor well location and we go straight in that line. There's no degradation, no elongation, no delay in the movement of the contaminant. It just goes straight in that line. But you can model that in this particular model, but that's what was put in.

Percent organic matter is allowed to be put into that section. What that will do is effectively retard the contaminant movement. In all of the movement done both by the Oil Conservation Division and myself, we did not allow for any organic material to be involved or to degrade any

contaminant.

Bulk density of the soil is an input. It kind of correlates with porosity.

Biological decay coefficient. You can have degradation of the contaminant over time. In all of the Oil Conservation Division modeling and my modeling we did not allow biological decay of any contaminant. Does it occur in the real world? Yes.

So those are the vadose zone variables. The source-specific variables, and this is basically where we get to the infiltration rate, which is the output of the HELP model becomes the input to the Multimed model. That's where I get that item from. You can change the area of the waste disposal in the source-specific variable. I tried to keep everything the same that the Oil Conservation Division used on the area of waste disposal.

Duration of the pulse. This is an important concept and it was discussed in the prior hearings and was pointed out in the initial modeling. Concerns by industry that we were moving more of a contaminant out of the bottom of the pit than even exists in the contamination in the pit to begin with. And the 2007 and 2009 modeling by the Oil Conservation Division, they used a 50-year

pulse. I have some more material to get into that, but you can change the number of years that the material is moving out of the pit or you can even have a continuous -- you know, if you have a dripping source you can model a dripping source. But duration of the pulse is important. Fifty years was used by the Oil Conservation Division. I used 20 years in my model because I tried not to substantially take more waste out of the pit than exists in the pit in the first place. I didn't think that was appropriate from a representation standpoint to the public to say you're getting five times the amount of waste potentially migrating than is even in existence in the pit to begin with.

The initial concentration, and for this particular modeling I stuck with the 100,000 milligrams per liter. The 100,000 milligrams per liter correlates to the table that IPANM and NMOGA, Table 2, it correlates to the 5,000 milligrams per liter SPLP figure.

How you get to that 100,000 is the 20 to one dilution amplification factor, the 20 to one ratio. What we are saying is what is coming out of the bottom of the reserve pit is 100,000 milligrams per liter of a contaminant. Arguably, 10 percent

contaminant coming out of the bottom of the pit. Is that realistic? I don't know.

Saturated brine, as Dr. Neeper knows, is probably 180 to 200,000 milligrams per liter. I don't know if we are going to be moving that, but that's the figure that we are analyzing from a protective standpoint.

Aquifer-specific variables that are allowed. Now we are down into the very bottom portion of the model. It has an effective porosity, bulk density, thickness which we said was 63 feet. It has a conductivity, a gradient which is an ability to actually have a far-field input so you can actually bring additional fluid in to move it through the model and/or dilute it. There was no gradient or degradation in the model to dilute the concentration. So, I mean, that setup was not allowed.

Dispersivity, as we were talking about, allowing it to elongate or move, we didn't allow those but the model is capable of handling that, and you can set the well distance or effectively the receptor distance. I said in 2007/2009 I was effectively right underneath the pit at three feet rather than the 100-feet, which is the most limiting

siting criteria. So those are the Multimed modeling inputs.

Q. Moving to slide No. 7, which is actually your modeling that you did for this hearing in 2012?

A. Correct.

Q. Which model input parameters did you use?

A. The important characteristics in what I modeled and what I am presenting to the commission in support of IPANM's recommendation and the industry's recommendation, in the modeling I used an evaporative zone depth of the top 48 inches. The reason 48 inches is used, I could use a higher depth, but 48 inches is the amount of cover material that we're recommending for soil cover. I don't think the model will not allow 50 inches, 60 inches. Sixty inches is the recommended maximum in the model. In New Mexico in the general literature or material, the representation is the maximum in the model is 48 to 60 inches that you can put it across New Mexico.

Precipitation values. I tried to focus, especially given the 100,000 milligrams leachate concentration, that's not going to occur up in Northwest New Mexico based on the information that is available. So that focus is primarily Southeast

New Mexico. Rather than picking one location in Southeast New Mexico, I tried to take a diverse grouping so I picked Hobbs, Maljamar, Roswell, Carlsbad and Artesia to give a more representative sample of the Permian Basin. If we were presenting information on Otero Mesa, which we are not, I would have included information in that category.

The Oil Conservation Division utilized 50 years of actual climate data in their modeling in both 2007 and 2009. They used that data from two locations: Hobbs, New Mexico for southeast and Dulce, New Mexico for the northwest. That dataset ran from 1951 to 2000. Effectively, those two locations are actually the highest precipitation points of any precipitation point in those two areas. I don't know -- that kind of feeds into when you continually -- when you are modeling and you continually take the highest parameters on one thing after the next, you can get a result that skews in one direction.

So what I tried to do in my modeling is I also utilized Hobbs, which has the highest precipitation value, but then have some comparable areas. Dulce, New Mexico in particular in the prior hearing, there isn't an oil and gas well, I believe,

within 13 miles of Dulce New Mexico. There's a number of additional locations that have data to use in Northwest New Mexico. One, unfortunately, is no longer collecting data, which I think may be important for the commission to know. That's in Lybrook, New Mexico. There's a natural gas plant there and that plant has been shut down here recently. I believe one of the reasons they shut down the plant has to do with some of the regulatory burdens that are being placed upon the industry in the state.

But that location happens to not be collecting any precipitation or temperature data. You could say use Lybrook, Lindrith, you could have used Farmington, Aztec, Bloomfield. There's a large number of other sites that could have been used but they used Dulce.

Q. Mr. Mullins, I guess this is the time to ask this question. We did prepare some rebuttal exhibits based on testimony that had been previously given, and IPANM Exhibit No. 17 is an output run that Mr. Mullins did pertaining to Aztec, New Mexico; is that correct?

A. That's correct.

MS. FOSTER: So we will be referring to

that as part of our testimony on direct today, if that pleases the commission.

CHAIRPERSON BAILEY: Yes.

MR. JANTZ: I have a quick question. The rebuttal testimony for 17, whose testimony is that rebutting?

MS. FOSTER: Dr. Neeper's.

MR. JANTZ: Thank you.

Q. (By Ms. Foster) So you did do a model at a later date pertaining to Aztec, New Mexico; is that correct?

A. I did. The reason is based on my attendance at the hearing, there was quite a bit of concern about the 25-foot depth to groundwater and the 100-foot lateral distance under the low chloride drilling fluid scenario, so I wanted to be able to present information to the commission to support industry's recommendations on the siting criteria specifically related to that, and because of Dr. Neeper's concerns.

Q. Now, pertaining to Hobbs, New Mexico, you mentioned that that is the highest level of precipitation rate based on the dataset that the OCD had. Did you use that same level of precipitation?

A. I actually used twice as much in Hobbs,

New Mexico. I previously referenced the HELP model uses daily data. What occurred actually if you take the daily dataset from Hobbs, New Mexico, the highest peak daily precipitation value was 1.97 inches during that 1951 to 2000 time frame. My modeling that I used by putting in the monthly average precipitation value built a curve, and in that distribution the highest peak was four inches roughly of precipitation on a single day. So taking that, you have the total amount of precipitation average for the year turns out the same but the modeling that I did actually has, on a daily specific value, specifically in Hobbs, twice as much water being present on that daily movement through the model.

Something that was different, and this is conceptually, I used the 50-year synthetic model for Roswell, New Mexico for the temperature profile and solar profile, and I used the actual monthly precipitation for these various locations and then adjusted it for latitude for the solar effect.

That's why I mention the Hobbs data, because you could say well, you pulled some of the water out that was in Hobbs before. Actually, I increased that variability twice the amount when you

look at the distribution and the standard deviations of the material.

In all instances in my modeling I used four feet of soil cover. I did not put any liner on top of the pit. I have a liner underneath the pit, which we have not brought up these terms in this particular hearing, but the taco method versus an enchilada or burrito method of covering down in Southeast New Mexico. So basically what we are recommending in both NMOGA and IPANM's position is no liner on top of the pit, that the taco method with the single liner on the bottom is protective of human health and the environment and that's where my modeling was focused.

Slide No. 8 is similar to the prior slide but it takes out all of the other 2007/2009 information and effectively demonstrates what I am presenting for my modeling to the commission in support of the recommendations of IPANM and the industry, and I will skip past this one and move on to the results.

Slide No. 9 is the summary of the results for my modeling with the 48 inches of evaporative depth in Southeast New Mexico, and the first line is the annual average precipitation values. Carlsbad,

Roswell, Artesia, Maljamar and Hobbs moving across the top. It's interesting to note the elevation. Obviously, elevation has a slight difference on atmospheric pressure and a few other things. I'm sure the model has that capability but I wanted to make note of that because they indicate that you need to be aware of elevation differences. It does have some slight minuscule amount you are closer to the sun, but I don't think the model does much with that.

The key results that came out of the HELP model based upon these inputs were infiltration rates. So this is the output, which is the third line down in millimeters per year of movement. 1.53 millimeters per year in Carlsbad; 1.17 in Roswell; 1 in Artesia; .51 in Maljamar; and 1.42 millimeters per year in Hobbs.

In comparison to Dr. Neeper's infiltration rates he utilized in his, I guess, slowest case his units were .05 inches per year, which is 1.27 millimeters per year. So I think if the commission was looking at comparison on some of the numbers and timing of things, based upon using the upper part of the model where Dr. Neeper did not model that section, an appropriate comparison would be to focus

on Dr. Neeper's lowest, longest time period because that falls in the 1.27 millimeters per year infiltration rate.

Dr. Neeper's highest level was 3.5 inches per year of infiltration which would correlate to 88.9 millimeters per year. So there's a significant difference. And I have all the other numbers for all the other modeling that's been done and we can get into that, but just focusing on what's been presented so far.

So we now have an infiltration rate from the HELP model runs that we would put into the Multimed model and now we want to calculate what the concentration of the contaminant would be and how long, how fast it would move to 100 feet vertical depth of vadose zone and 100 feet laterally to the receptor. Utilizing the model, and this is the number of years, it ranges from 3100 to 9200 years, and that would be from coming out of the bottom of the pit to arriving at the receptor of someone's well 100 feet away.

What I'm going to touch upon next is the concentration, because that is the first arrival of the first measurable amount of contaminant, and what I defined as a measurable amount of contaminant is

one milligram per liter change, which is effectively the smallest unit that I could see. If I had a half of a milligram per liter change, I didn't indicate that it had arrived, so it could have arrived at 3,000 years exactly in the Carlsbad case, but it might have only arrived at a .5 milligram per liter level and I said that's not statistically significant enough to say it arrived, so I used the one milligram per liter threshold cut-off so that's where that year arrives.

I then looked at the distribution or how the arrival of the contaminant occurs over time at the receptor and I tried to -- I looked on there at what point does it reach a peak. So the next line down where it says years until maximum chloride concentration is reached, that's the number of years it would take to reach the peak chloride level at the receptor, and that ranged from 4500 years to 12,800 years.

Then this is the final line, probably the most important line. It's the concern of what is the level of contaminant that actually arrives at the receptor 100 feet away. This is the maximum chloride level change that comes from my model. It ranges from eight milligrams per liter change in

Maljamar, which is the longest time period, to 68 milligrams per liter in Carlsbad.

This is where we need to talk about the relevance of the risk assessment. In the prior Oil Conservation Division Pit Rule hearings the assumption was made that the groundwater contained 50 milligrams per liter of base salt concentration. So if we are going to make that assumption you would add these numbers at each of these locations: Carlsbad, Roswell, Artesia, Maljamar, Hobbs at each specific location. You would add 50 milligrams per liter plus that figure, 68 milligrams per liter, and you get 118 milligrams per liter.

If you were at the receptor well and you were measuring the chloride at that point, you would expect to see 118 milligrams per liter. It's important to note because we were concerned about a drinking water level standard of 250 milligrams per liter. I guess the point that I have is the modeling of the concentration, even given the number of years, according to the modeling does not even indicate it to be higher than what drinking water standards would be in the groundwater at that point.

So with regard to risk assessment, I think that should factor into the commission's decision

when you weigh the evidence.

To move to my concluding slide, based upon my analysis and review of the prior 2007 modeling, the 2009 modeling of the HELP and Multimed, the historical information, my professional opinion reviewing this is that four feet of soil cover is protective in all instances; that there's no liner that is necessary to be placed on top of the pit for adequate protection of freshwater resources, human health and the environment.

I believe a 100 foot siting requirement is protective of public health and the environment based on the analysis. Precipitation and evaporative zone depths will drive the infiltration rates that come from the HELP model. And that based upon the HELP modeling, the Multimed modeling of chloride, which is the most mobile constituent that we are looking at, there is negligible risk to human health and the environment and the public and accessible groundwater from even a 10 percent chloride leachate coming out of the bottom of a pit.

For these reasons and the information presented, IPANM and myself recommend that in instances where groundwater depth is greater than 100 feet that it's not necessary to perform testing

and go to the same level of work to ensure that the public health is protected and the environment.

CHAIRPERSON BAILEY: On that note, why don't we take a ten-minute break?

(Note: The hearing stood in recess at 10:28 to 10:45.)

CHAIRPERSON BAILEY: We will go back on the record.

MS. FOSTER: Thank you, Madam Commissioner.

Q. (By Ms. Foster) Mr. Mullins, you included as one of your exhibits the Soil & Groundwater Research Bulletin No. 9. Would you please describe the exhibit and its importance to the commission?

A. I believe this is Exhibit No. 13 in your exhibit books. This was prepared by the Groundwater Protection Council, as I recall, and it discusses a non-aqueous phase liquid mobility limits in soil. In my earlier testimony I was discussing chlorides or the salt movement, and I want to put some information and have some discussion about the other constituents that are represented in the tables and their thresholds for consideration by the commission.

And I believe this reference, which was

published in June of 2000, is relevant for the commission to review. Basically by a non-aqueous phase liquid, we are talking about the hydrocarbons. Mobility, we are talking about what level or saturation level of potential hydrocarbons would become mobile and at what level would they be a concern from a regulatory standpoint, from a public health, environmental risk standpoint.

I believe the data that's summarized in this report and the tables that are presented that deal with TPH, total petroleum hydrocarbon, GRO/DRO, Benzene, BTEX and any of the other hydrocarbons constituents, are relevant.

There was some discussion previously in the hearing about Benzene in particular and some concern about the Benzene level threshold, and the question was raised of Dr. Thomas would he consider, I believe it was, 100 milligrams per kilogram to be protective of human health and the environment. I believe he testified yes, and I believe he received a second question that said would 1,000 milligrams per kilogram be protective of human health and the environment and he responded yes.

The information in this particular paper would support a Benzene level of 53,000 milligrams

per kilogram as being protective from a mobility standpoint. It has some additional threshold levels. In particular, Table 1 of this report, which is on Page 3 of the report for the commission, at the top of this paper -- I'll see if I can zoom in for those that are here in the audience. Let me blow this up slightly.

In Table 1, I guess we are looking at the third column of Table 1 which is "See Residual Soil" or the residual soil concentration in milligrams per kilogram from a mobility standpoint. And the level that's indicated based upon the information in this report and from the Groundwater Protection Council for concern would be 53,000 milligrams per kilogram in the report. That differs from the saturation level, which is the next column, which is obviously significantly lower than that.

The reason I discuss and wanted to point out this information to the commission is because the industry does have recommendation levels in the Table 1 and Table 2 which are significantly below these thresholds, dramatically below these thresholds. The next --

Q. Actually, before you move on, what is the industry recommendation for the Benzene level in

Table 1 and Table 2?

A. I have to take a moment to look at Table 1 and Table 2 or I might misspeak. I believe in every instance the recommendation is for a Benzene threshold level of 10 milligrams per kilogram at all depths in all of the tables.

Q. Okay. And actually, while you are looking at those tables, what are the recommendations for industry for TPH and GRO/DRO since you're there?

A. The TPH level changes based upon the depth to groundwater. The TPH level changes. In Table 1 -- TPH is the summation of the GRO/DRO, GRO, gasoline range organic, DRO, diesel range organic. It starts out in Table 1 at a threshold level of 100 milligrams per kilogram and moves up from 50 to 100 feet to groundwater at 1,000 milligrams per kilogram and then greater than 100 feet at 5,000 milligrams per kilogram.

BTEX, which BTEX actually includes the Benzene portion of the range, so I believe that's why it's consistently listed at 50 milligrams per kilogram on BTEX, and obviously ten of that could be the Benzene portion but covering the other items it gets 50, and that's 50 in every instance. And I believe that covers the other constituents. We have

covered TPH, BTEX and the Benzene threshold.

To reference the other -- within Exhibit 13, the other recommendation levels for the commission to consider, you need to turn to Table 2, which will be on Page 5 of the report. If you look at -- I'm going to change to a different table. Table 4, which will be on Page 7. Let me switch that. It's represented in Table 2 but it's represented more clearly in this Table 4.

In Table 4, which is up on the screen, on Page 7 it recommends residual soil saturation level for middle distillates in the 8,000 milligrams per kilogram range and the 8,000 milligrams per kilogram is higher than the highest recommended value, which was 5,000 milligrams per kilogram that the industry listed for TPH, so that would be the reference to utilize for that.

Q. Thank you. Now, as you had already discussed, did you personally perform model runs and provide your model runs as exhibits to the commission and interested parties to review for this hearing?

A. Yes, I did.

Q. Directing your attention to Exhibit 7, is this the run for the HELP model?

A. Yes. Exhibit 7 are the HELP model runs I performed for each of the locations: Artesia, Hobbs, Carlsbad, Maljamar and Roswell.

Q. And Exhibit 8?

A. Exhibit 8 are the Multimed model run outputs that correspond for each of those locations.

Q. Did you provide us with the model manuals for both HELP and Multimed?

A. Yes, I did. I figured that we might have a lively discussion about computer models so I thought I would include the manuals so we could go through them in-depth if so desired.

Q. That is Exhibits 8, 9 and 10 -- sorry, 9, 10 and 11, correct?

A. Exhibit No. 9 is the Multimed model manual, Exhibit No. 10 is the HELP model manual, and Exhibit No. 11 is the HELP engineering manual.

Q. Now, could you please describe Exhibit No. 12 for the commission.

A. Exhibit No. 12 are the climatological data sheets that I utilized from USclimatedata.com. That's the government website for the average precipitation values for Artesia, Hobbs, Maljamar, Roswell and Carlsbad on a monthly basis that I used as the inputs in the site-specific HELP model runs.

Q. All right. You already discussed Exhibit 13. How about Exhibit 14, please?

A. Exhibit 14 is really a reference exhibit for the commission. We haven't discussed arid versus semiarid environments. Exhibit 14 is a brief USGS paper discussing burial of waste in arid environments. It has some language and background information about burial and chloride concentration movements and indicates in the paper what industry has testified to previously, that vegetative cover is obviously an important aspect and having the vegetative cover will reduce the infiltration rate.

Q. Does Exhibit 14 qualitatively agree with your modeling results?

A. Yes, it does.

Q. And the precipitation levels in the Mojave desert in Nevada, are those higher or lower than Northern New Mexico?

A. Well, they can be similar to several locations in Northern New Mexico. Several of the locations in Northern New Mexico may receive only eight inches of precipitation and could be in that environment. One of the principal reasons the focus has been in Southeast New Mexico is the chloride concentrations are higher and also the precipitation

and just movement of contaminants would be hirer.

MS. FOSTER: At this time I move Exhibits 5 through 14 into evidence.

CHAIRPERSON BAILEY: Any objection?

MR. JANTZ: Yes, I might have several, Madam Chair. Let me get organized here for a second. No objection to Exhibit 5. I do have an objection to Exhibit 6, Page 2 Mr. Mullins' discussion about risk assessment. Mr. Mullins wasn't qualified as an expert in risk assessment at all and he is not qualified to talk about it. For that reason, I object to that slide and ask that his testimony regarding risk assessment be stricken.

The only other objection I have is to Exhibit 13, the American Petroleum Institute Report on the basis that it's not relevant. In the abstract section, the last paragraph of the abstract section says, "The paper addresses immobile bulk NAPL in soils at concentrations up to the threshold of mobility. This document does not address the movement and flow of NAPL, the dissolution of NAPL chemical into soil pore water solution, nor NAPL volatilization into soil pore air." So to the extent that it's being offered to talk about standards for protecting groundwater it's entirely

irrelevant.

MS. FOSTER: Madam Chair, concerning Exhibit 13, if I could ask the witness?

Q. In terms of your modeling, did you do modeling of the soil core water solution and what is that?

A. I guess the best way to answer this is to look at how the modeling has been presented in the past. In 2007 and 2009 the mixing zone depth in particular was set to be four inches. If we were modeling, which I did not do in this particular case, the movement of hydrocarbon, it would float on top of the water so it would reside in a mixing zone that would be very narrow similar to, you know, four inches.

I think the relevance of Exhibit 13 is that it sets a standard for both -- and information for the commission to consider with regard to what the saturated level is within soil and a mobility level of the constituents to be of concern. It doesn't mean they are not going to move. There hasn't been any testimony that I have given that a contaminant is not going to move. Just that at what level is it going to be a risk. I believe this document is useful for the commission to consider as

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they look at industry's recommendations of Tables 1 and 2.

Q. As to Exhibit 6, your title of Slide No. 2 is Risk Assessment. You talked a little bit in your testimony about degradation, non-degradation. Is it your job here at the hearing to tell the commission how to dictate policy on this or are you here making recommendations based on your modeling?

A. I am here making recommendations, and I believe that discussing the risk, especially to public health and the environment, is the focus, the primary focus of the hearing and the commission. And I think that's what we do and what I do as a professional engineer and as a petroleum engineer in the business. I assess risk. I assess the risk from the initial stages of drilling a well through the various phases of operationally drilling the well through closure and completion and rehabilitation.

I believe that my experience and knowledge with regard to the contaminants associated with oil and gas reserve pits and the information in particular that I presented to the commission would support my professional engineering opinion to be given on the risk of contaminant movements related

to oil and gas activity. So I guess I disagree with counsel's suggestion on the rejection.

CHAIRPERSON BAILEY: The commission will accept the exhibits but will take into account Mr. Jantz' comments and note them to give the correct evaluation of those specific exhibits.

MR. JANTZ: Thank you, Madam Chair.

(Note: IPANM Exhibits 5 through 14 admitted.)

Q. Thank you. If you may move on. Now, Mr. Mullins, did you hear testimony by Dr. Neeper on siting and closure requirements of temporary pits?

A. Yes, I did.

Q. In fact, the Independent Petroleum Association as well as NMOGA's recommendations are as to the depth of groundwater for a temporary drilling pit there's a recommendation to reduce the minimum depth from 50 feet to 25 feet. Do you have an opinion based on your modeling experience as to the potential impacts to groundwater?

A. Yes. There was quite a bit of concern brought up in the hearing about the 25-foot depth in relation to the siting criteria of 100 foot, especially in the low chloride drilling fluid scenario, which the principal area for that is in

the Northwest. And the reason that the industry has requested the reduced siting criteria is to be able to properly function and adequately be able to exploit the oil and gas resources in the northwest. We have a great deal of existing infrastructure in the northwest, existing well pads, existing pipeline corridors. We also have a significant amount of public land resources, including archaeological resources, and we have to balance all of these resources when we need to drill a new well.

So what we found is that since the implementation of the first Pit Rule, we have many existing well pad locations where we are not able to twin the existing well pad location, which has a cost savings on surface disturbance, pipeline cost, just drilling access and facilitation. We are not able to actually drill a well because of the current Rule 17 restrictions on the siting criteria.

So given the concerns that were brought up about the 100-foot level and the 25-foot to groundwater, I prepared an additional exhibit for the commission to consider and it was a rebuttal exhibit and I'm not -- I have it here, I guess, on the computer to bring up. I'm not sure if it's been distributed.

Q. It has been distributed to all parties as required, and there are five copies of the exhibit in the back of the room for the public as required by the regulations.

MS. FOSTER: At this time I would move Exhibit 16 in for demonstrative purposes so the witness can discuss it.

CHAIRPERSON BAILEY: Any objection?

MR. JANTZ: None.

CHAIRPERSON BAILEY: So permitted.

THE WITNESS: If I can have a moment to go on my E-mail to pull it. It's not on the zip drive that we have here.

Q. How about we skip that and move to the other parts of your testimony and at the next break we can try to pull that up?

A. I think that's appropriate. I apologize for not having that on a hard drive ready to go. I can talk about it but it might be useful for everyone else in the room to see it.

Q. So were you present for Mr. Gantner and Ms. Mary Ellen Denomy's discussion of increased cost as related to Rule 17?

A. Yes, I was.

Q. Do you have any comment related to

Ms. Denomy's comment that only commodity pricing affects the levels of drilling in New Mexico?

A. I would disagree with that assertion. There's a number of factors that you look at when you decide whether to drill oil and gas wells. That's what I do for a living, and commodity prices is one of those items of concern. When you look at drilling wells and we're discussing risk, you actually discuss geologic risk on whether you are going to have the resource in place. You have an operational risk on drilling the well.

One of the items that really is the focus of the hearing here is we are talking about regulatory risk and/or regulatory certainty. When you go to drill oil and gas wells and you make decisions upon where you want to drill the wells, you look for as much certainty with regard to risk in every category that you can.

Specifically, dealing with regulations and the Pit Rule in particular, you want to have a regulation or rule that you understand, that is not subject to multiple interpretations and is not going to surprise you with several hundred thousand dollars added expenditure because it has a minor tear in a liner above the mud line or the water line

where the waste material is and then suddenly have to excavate the entire site and haul it off.

The existing rule leaves that open to subjective interpretation where that could occur. So I think when you want to decide whether you are going to drill in New Mexico to drill wells, you want to look to the regulatory environment and in particular to the Pit Rule and make sure that you have a framework that you understand, that the regulators understand, and that you can put into your economics and work from. And in my opinion, based upon the Pit Rule's implementation, it has raised cost and has deferred investments to more lucrative areas. Obviously, commodity pricing as she testified is one portion, but the regulation aspect is a significant one and why industry is here before the commission to recommend these changes.

Q. Do you think accountants should be involved in economic decisions pertaining to oil and gas wells?

A. I have two accountants at our company, and I don't think I have ever asked them where to drill a well or how to drill a well. I have asked them how to reduce my taxes and what the tax implications are, but I listened to Ms. Denomy's testimony, and

I'm not an accountant, but I can tell you that I rely upon geology, engineering and the professionals that work in that daily on the representations on where to drill. And I do visit with the regulatory folks, and the regulatory folks that I have talked to, the Pit Rule along with a number of other rules and regulations here in New Mexico are having a cumulative impact that defer and make people want to defer their investments. And that may be on a time basis until commodity prices improve or it may be permanently.

And the challenge as an independent oil and gas producer, and I am here testifying on behalf of IPANM, is we don't have regulatory departments. We don't have these additional staffs of people to just file reports and do things just because they are there. We want to be able to work under a framework and have an existing framework, I believe, here in New Mexico that when the oil and gas major companies decide to move their operations to outside the United States, that smaller Farmington-based companies, Southeast New Mexico-based companies can work with their smaller staffs and lower overhead in a manner to develop the oil and gas resources efficiently and productively so that the citizens of

New Mexico can benefit from the royalties that come from that. My fear is that these added regulations and added standards at every level are harming that.

Q. Did you listen to West Largo's presentation, public testimony concerning their costs and did you look at their AFE's?

A. Yes, West Largo Corporation, which is a Farmington small independent similar to our company, brought an exhibit forward and presented that they had drilled a shallow Fruitland coal well. It's important when you look at AFEs, and that's what I do for a living is prepare AFEs and analyze them, is that the portion that he presented was what's called a suspended portion of the AFE or basically the drilling portion of the AFE. It doesn't have the frac job in there, doesn't have the tubing, doesn't have the pump jack, doesn't have the separator on the material. He was looking drilling phase to drilling phase.

My prior testimony in the Pit Rule hearing in 2007 was that if I was going to drill a 900-foot well in-depth that I was anticipating an added cost of $30,000. He is representing that he is drilling under a closed-loop situation a shallow Fruitland Coal well 2200 feet and he had approximately

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$100,000 increase in his drilling portion of his AFE.

And that's what we are seeing. We are seeing those added costs for, in my opinion, very little additional protection. What that does is it actually wastes the resource. It causes small companies like West Largo, myself, other independents, not to drill. I don't think that's what we want to do if we want to move up the list of some of the exhibits where we presented where New Mexico ranks in oil and gas production.

I think we can move up those ranks and still have protective regulations. But obviously, the Pit Rule is one that we feel strongly about as industry, and that's why we are here asking for these changes.

Q. Now, moving on to the IPANM petition, can you point to your top six items that are important to IPANM and the changes to the Pit Rule?

A. When I participated with the NMOGA work group, the key criteria that we were looking for in the new rule were a more permissive siting requirements. We believe that the recommendations that we put forward achieved those workable goals. We asked for some changes to the testing

requirements, specifically IPANM was asking for no testing where groundwater is greater than 100 feet. And in addition, we've got some concerns about closed-loop systems. We believe if we are utilizing closed-loop systems -- and we can get into a discussion on that -- but the cuttings are not going to reside on the well site being buried in any manner, deep trench or burial in place; that we should not have testing in those instances.

The other concern that we have, and it hasn't really been addressed except for Ms. Denomy's testimony, which was air drilling and cavitation. We deal with underbalanced drilling fluids in the state of New Mexico, specifically in Northwest New Mexico. And the regulation is silent in the NMOGA petition except for the word "cavitation." We want to ensure that the existing practices with regard to underbalanced drilling for air and cavitation purposes -- air, natural gas -- are appropriately handled in the rule.

So IPANM has some minor language that was added to ensure that existing practice is protected. And as many people may know, if you utilize an air or underbalanced drilling system you have less fluids. You have less things involved that might

lead to an instance of contamination.

The next item of major concern was we wanted to ensure that there was no liner installed on top of the pit burials, especially for the burials in place. We were concerned that in Texas right across the border there is not the requirement for the liner on top of the pit. We think that the recommendation the industry has made to allow burial in place in Southeast New Mexico where groundwater is greater than 100 feet is a good, balanced recommendation that will allow operators to drill like they are drilling in Texas.

We had some concerns about the Oil Conservation Division's changes for reporting of wet or discolored soils without testing and meeting the requirements and its potential conflict with the Spill Rule. I'm not an entire expert on the Spill Rule, but we had those concerns so we wanted to make sure there was no conflict between the Pit Rule regulation that comes out and the Spill Rule.

Overall, we wanted to ensure that there was an ability by the regulators and the operators to have a common sense application of the rule that was based on the science and allows operators that certainty to develop their reserves. So those are

the main six points.

Q. Now, before we get into these specific concerns that you just outlined for the commission, let's look at some definition changes that are recommended by the IPANM in their application. I point the commission to the IPANM modifications of 5/15/12.

A. As in May 15th of '12?

Q. Yes. IPANM's petition was based on the NMOGA petition and the specific IPANM changes are highlighted in yellow on the draft of May 15th. Those were E-mailed to all parties during the last hearing. So directing your attention to 19.15.17.7 the definition section, C is the definition for closed-loop system.

A. Yes.

Q. Under the NMOGA petition if an operator uses a closed-loop system would he need to notify the OCD for use of the system?

A. Yes.

Q. And why would notification of use of a closed-loop system be relevant?

A. I think it's important for the regulator to know if you are going to utilize effectively really a burial in place or not on the location. I

don't think it's important for the regulator to know specifically what makes up your closed-loop system, how many tanks. The concern that I have, especially as a petroleum engineer, is we use the term closed-loop system in a cavalier manner and we need to be careful about the use of what I term solids control equipment versus where the burial of the cuttings occurs.

So with regard to the closed-loop system, I think that the important criteria is the regulator should know whether the cuttings are going to be buried on-site, not regulating whether there's four tanks or three tanks or if there's three desanders, two centrifuges, one desilter, those sorts of things. They should just know are the cuttings going to leave the site or not.

Q. So, therefore, in the IPANM petition looking at Section 9, Permit Application, 19.15.17.9, Permit, A, we make the recommendation along with NMOGA that an operator shall use the C-101, C-103 or applicable BLM form to notify the appropriate division office; is that correct?

A. That is correct.

MS. GERHOLT: Excuse me, which page is that?

MS. FOSTER: Page 5 of the IPANM petition.

MS. GERHOLT: Thank you.

A. I'm sorry, I didn't hear the question.

Q. So we make the recommendation concerning the notification, but not of registration or permitting of closed-loop systems?

A. That's correct. It's a notification so the regulator will be notified not obtaining a permit or application, which again would experience delay, additional time.

Q. And IPANM specifically deletes the next line that the closed-loop system shall use appropriate engineering principles and practices. Would you explain why we made the recommendation to delete that language?

A. We are concerned about regulatory certainty, and we think leaving that sentence in the rule leaves open for a potential regulator at any level, whether that's the state level or the field level, to pursue, I guess, for lack of a better term, a personal concern on what types of closed-loop system materials that you have. So we would rather not -- IPANM's situation, we would rather not have that in there, because if the closed-loop system consists of a tank, we have

instances where closed-loop drilling occurs but we do not have desanders, desilters, centrifuges, all these items. We have steel tanks and we drill during daylight operations. We are concerned that the definition could come forward that closed-loop systems means you have to spend $10,000 bringing in a desander, desilter, all this ancillary equipment in bins when your closed-loop system for your small shallow operational activity is the steel tank, that you are cleaning out the solids that settle to the bottom of the tank with a backhoe bucket and hauling it off. So we don't believe it's appropriate to have that in there.

Q. Are you talking about subjective enforcement by the regulators?

A. Yes.

Q. Pertaining to the solids control equipment that is used, would a larger company want to call something a closed-loop system differently than what a small company might use and define as a closed-loop system?

A. Yes. I believe I just said that, and I believe there's a lot of misinformation about what is a closed-loop system versus what I would term in an engineering standpoint solids control equipment.

Q. And the definition of closed-loop system, IPANM is recommending an additional change, specifically the deletion of workover fluids to the definition. Can you explain why we ask for the deletion?

A. I previously mentioned that workovers and the regulation of workovers were what I call an unintended consequence of the last Pit Rule. The focus, and I believe it's the proper focus for the commission and the regulation is what happens to solids, what happens to the drill cuttings.

When we start getting into regulating the workover activity we are basically having to file for every single workover operation, every pump change potentially where you might have to bring out tanks, we are having to file C 144 EZ forms or go to additional hurdles to basically perform a pump change. And it's just an added regulatory burden that I think is not only on the operators but it's also upon the Oil Conservation Division staff because the risk criteria we are looking at is the handling of solids.

Q. Okay. Looking at your definition of temporary pit, which is Definition Q in the IPANM petition Page 3, IPANM added the language "and

solids," so the pit will hold liquids and solids and will be closed in less than one year from the spud date.

A. Correct. Under the definition for temporary pit the IPANM is recommending that we put the word "solids" because obviously the pit is not just going to hold liquids, it's going to hold the drill cuttings, and we want to make sure we are not caught in some technicality. We also make the recommendation that the pit will be closed -- when does the pit date start? We are recommending for ease of simplicity the use of the spud date so that's why we put that in.

Q. Now, I actually managed to download your exhibit onto your thumb drive. If you could insert the thumb drive, and it is Exhibit No. 16 so we can talk about some siting requirements. This is Exhibit 16?

A. Yes.

Q. Please walk the commission and the public through your exhibit there.

A. Exhibit 16 I prepared and the date is June 11, 2012 so it was prior to us convening here, but it's been distributed. This was the material that I prepared in relation to the 25-foot to groundwater.

So looking at Slide No. 2, what I have done, all of Exhibit 16 is all of the material. It includes my main slide presentation, it includes the HELP model runs, the Multimed model runs. It's all in one package, just for description.

What we are looking at is the concern was -- I misspelled the word "chloride." We are concerned with low chloride drilling fluids which we defined in the regulation as less than 15,000 milligrams per liter. We came up with that figure because operationally working with 2 percent calcium chloride or -- yeah, 2 percent calcium chloride was equivalent and we could work under that standard as a low chloride drilling fluid and it rolls into completions and those sorts of things.

But the concern was brought up about 100-foot receptor distance or a well within 100 feet of the pit contents. So what I did is in this instance is I did use two different scenarios. I used Carlsbad New Mexico for Southeast, and then I included in this instance an Aztec, New Mexico run to give a relation. Because principally the low chloride siting requirement standards are in the Northwest, so I picked that standard.

I wanted to remind the commission that the

highest reading of chlorides from all of the testing that had been done by the industry and the Oil Conservation Division in Northwest New Mexico was 5290 milligrams per kilogram in the Northwest. If we use the 20 to 1 delusion SPLP method, that would mean what would be a leachate coming out of the bottom of the temporary pit would be believed to be 265 milligrams per liter, so that's what if we use the real world data, use the same analogy, you would use 265 coming out of the bottom of the pit.

The modeled leachate I used in this scenario is 1,000 milligrams per liter and that corresponds to some prior work that was done by the Oil Conservation Division both in Dulce, New Mexico at the shallower depths, but I used 1,000 milligrams per liter as the leachate.

The results indicate that the siting requirements that we have recommended as industry, the 100-foot in the low chloride drilling situations are protective of freshwater, human health and the environment.

Q. Before you move on, I think there was a mistake that you just stated. This is the modeling for the depth of 25-foot to groundwater.

A. Correct.

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Q. So your layer is not 100 feet as it was in the previous modeling runs, now it is 25 feet, correct?

A. That's correct, and that's shown on Slide 3. When you look at the left-hand side of the graph there's four foot of surface cover, 12 and a half feet of drill cuttings and waste, and rather than having the 50 or 100-foot as the representation of the vadose zone depth you have 25 feet and the other parameters. So this is the conceptual model that we are representing for two locations, one in Southeast New Mexico and one is Northwest New Mexico.

Slide 4 is the summary of the results of the low chloride drilling fluid, and based upon the Carlsbad parameter, the infiltration rate was 1.53 millimeters per year. This gets into the discussion about Northwest New Mexico and the climatological data and it being quite a bit different or lower than the Southeast.

Actually, my figures came in at .01 millimeters per year, very on the low end of not only the historical data, but -- so I really couldn't make the contaminant move using the Aztec climatological data, so I had to assume that I'm using a higher infiltration rate. I basically had

to utilize the 1.53 infiltration rate from Carlsbad in order to get some results to present to the commission.

If I use the Aztec data, it will move because the contaminant will move, but it's so slow and the concentration is so small that when I get to the 100 feet away I cannot detect it in the model. I mean, just my specific digits. And I am running run after run after run trying to find where it really arrives. And I think that's because, number one, under a low chloride drilling fluid situation, the contaminant source is so much less that the risk to the public and/or potential contaminant movement by the time it gets there, it's not detectable.

That's shown in the results that I have presented for under a Carlsbad scenario where it would take approximately 950 years to travel down 25 feet and then move laterally 100 feet. And the maximum chloride would be reached at 1350 years and that concentration reading would be 2.3 milligrams per liter. So if the leachate that's coming out of the bottom of the pit is 1,000 milligrams per liter, by the time it comes down and moves 100 feet -- 25 feet and moves laterally 100 feet, it would be detected at 2.3 milligrams per liter at 1350 years

through the vadose zone.

Again, this is not moving in saturated flow. This is vadose zone unsaturated flow. So the risk is the contaminant does move but it's at such a small level, I don't believe it's damaging to public health or the environment.

Q. Did you come to any conclusions based on your modeling?

A. I did. Some of these are the same. That four feet of soil cover, again, I believe as industry stated is protective in all instances. Again, no liner is necessary on top of the pit. And in locations where we have 25 foot to groundwater, for burial in place where low chloride drilling fluids are being used, that that's protective.

The 100-foot siting requirement which there's been some concern about, I believe it's protective in all instances but specifically where it was brought up for concern in the low chloride drilling fluid environment.

Q. Thank you, Mr. Mullins. Did you prepare Exhibit 16?

A. Yes, I did.

Q. Including the model runs included on Pages 6 through 19 of that exhibit?

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A. Yes.

MS. FOSTER: At this time we move this exhibit into evidence, Exhibit 16.

CHAIRPERSON BAILEY: Any objection?

MR. JANTZ: No.

MS. GERHOLT: No objection.

CHAIRPERSON BAILEY: So admitted.

(Note: IPANM Exhibit 16 admitted.)

Q (By Ms. Foster) Moving on and back to the IPANM petition, one of the changes that was recommended was on Page 2 under definition Section E, continuous flowing watercourse?

A. Yes.

Q. That recommendation was made and can you please explain how the changes recommended would help IPANM members?

A. Well, there's been a great deal of concern where I discussed we wanted regulatory certainty. We believe that the definition that we have for continuously flowing watercourse and specifically the second portion where it says, "This does not include he ephemeral washes, arroyos and similar depressions that do not have water during the majority of the days of the year," that that gives the certainty to operators up in Northwest New

Mexico when we go out to site and make the initial investments, even to find a location to drill, that we are not going to come back at the time we file our application and the Oil Conservation Division is going to say, "Well, this is right next to the flowing watercourse," and you are arguing about whether it's a flowing watercourse or not, at what time of the year, and is this a real -- you know, what is a watercourse.

So we include the language continuously flowing watercourse, and we believe it's adequately addressed by referencing the USGS map giving the certainty both to the operator and the OCD on that definition.

Q. Now, in preparation for your testimony did you review the OCD recommendations on this issue, the significant and continuous watercourse issue?

A. Yes, I did.

Q. Are you aware the OCD is recommending that in the case of a temporary pit, the excavation of materials or on-site burial that we need to have siting distances for both significant and continuous watercourses?

A. Yes. That's the concern. We would like to not be subject to multiple interpretations. We

believe that the goal -- this is where you get into significant versus continuous and we believe that this gives us the regulatory certainty to work with up in Northwest New Mexico. I believe the modeling that's been performed is protective of even if we are within 100 feet of those watercourses. So we need that certainty. We don't want to get caught in a technicality.

Q. In fact, the OCD recommendation makes it even more difficult than even under the current Pit Rule by adding the requirement of significant and continuous watercourse, correct?

A. The word "significant" is a problem for the industry.

Q. And IPANM added a new definition for wetlands. How does that new definition impact operators? That would be T on Page 3 of the IPANM petition.

A. Page 3, the wetlands definition?

Q. Yes.

A. Specifically our concern and what we have in the wetlands definition is towards the end of it. It says, "This definition does not include constructed wetlands used for wastewater purposes." The concern that we have is that if we build -- if

there's retention ponds or anything that are kind of built out on the land, we suddenly have changed -- we have moved in that we now have a wetland. So our concern is we are trying to define wetland, what a wetland is, and that's why the full definition written under T is the recommendation we have from IPANM.

Q. And IPANM also added the suggested definition of groundwater in Subsection I. Do you see that?

A. Yes. I on Page 2.

Q. If you would read that definition, please.

A. "Groundwater means interstitial" -- I'm not sure if that's spelled right -- "interstitial water that occurs in saturated earth material and is capable of entering a well in sufficient amounts to be used as a continuous water supply."

Q. Would you explain that definition to the Oil Conservation Division? Is this the definition used by WQCC?

A. I believe it is. Our concern is, and there's been different terms utilized for water resources, is it perched water? We are trying to say is this a usable amount of water. That's what our desire and goal is. We don't want -- if we have

an unusual rain event localized in an area in an arroyo up in Northwest New Mexico and we happen to go out that day for the inspection and have some water standing there, that we are suddenly subject to that being a groundwater resource, and that's the concern.

Q. Now, for the purposes of clarity, the WQCC definition does not use the word continuous; is that correct?

A. That's correct.

Q. So continuous is an IPANM recommendation to the WQCC definition; is that correct?

A. Yes.

Q. And that is for the purposes of clarity. Are you aware of any operators in the northwest who had issues with this groundwater definition as pertains to working with regulators up there?

A. I have been told about that but I can't remember specifically at this point.

Q. Since we are talking about siting, there's also a new definition of low chloride versus high chlorides in the proposal. Could you address why this distinction is included in the proposal?

A. This gets to the concept again of having a risk-based rule; that we believe when you are

utilizing the base fluid systems that are nearly freshwater, 10,000 TDS being that level, that when you are at 15,000 on the liquid state that the risk associated with that is very low. If you had one part freshwater at 50 milligrams per liter and you mix the two together, it's diluted to such a level that it's not going to be as much of a concern.

So what we have tried to do is have the regulation of Rule 17 focused in application of the rule where the concern is, at the higher chloride levels, the higher contaminant levels. So by setting the low chloride drilling fluid standards it gives everyone the comfort that we are working with safer fluids.

Q. Let's move on to Section 19.15.17.13, the closure section, which would be Page 26 of the IPANM application. You mention that in the IPANM proposal operators will no longer need to test pit contents that have depths of greater than 100 foot to groundwater.

A. Correct.

Q. Can you explain how an operator will determine what the depth to groundwater is?

A. Yes. We have a number of ways to do that. Consistently right now we are researching what the

depth is to groundwater. We can research the available databases from the State Engineer's Office. We can utilize actually nearby well locations. One of the most specific ways is to look at the well logs on existing oil and gas wells and you can get an idea from the well logs where the water formations would be.

You can have cathodic protection wells that are drilled in a particular area. You have the existing water wells in the water database that indicates the depths that the wells are drilled as well as the level that the water would rise within those water wells, and that gets into some of the discussion between confined and unconfined that was discussed earlier.

The point that the industry wants to make certain is that we are defining the depth to groundwater at the depth it is drilled into. If we drill a well and encounter groundwater at 260 feet, for instance, and there's a water well there but the level of water within the water well rises to 20 feet from the surface, we don't want to be caught in the situation where the depth to groundwater is 20 feet where in reality the depth to groundwater is 250 feet. So that's where that language that we

attempted to put in by confine versus unconfined is directed. There may be a better way of saying that than we have said it.

Q. Based on your experience, how often will depths to groundwater in the San Juan Basin be greater than 100 feet?

A. Nearly -- other than within what was called the original vulnerable area and along the river areas in some canyon bottoms, it will be nearly everywhere.

Q. And if I look at the Office of the State Engineer, will I find depths to groundwater for wells?

A. Yes, you will.

Q. If I look at the water's database and look at the well log files, how would an operator interpret this information?

A. You could determine the depth to groundwater from that information.

Q. So if I look at the language in the proposal, the depth I need to be concerned about is unconfined groundwater greater than 100 feet from the bottom of the disposal pit or trench. What depth are we truly looking at?

A. We're talking about the depth that you

drill into the groundwater, so 100 foot below the depth of the pits. Technically, from the modeling that is presented, in that specific instance it would have four foot of surface cover, 12 1/2 feet of waste and then 100 feet below that point, but we are recommending that 100 feet is a sufficient criteria to use.

Q. Is there a concern about using perched water as a groundwater source?

A. Yes, that's the concern, that that's not a usable water resource. It's a temporary occurrence of water in that area.

Q. Now, you were present for Dr. Neeper's testimony and did you hear about his concerns about confined versus unconfined water and how the operator would determine those standards?

A. Yes.

Q. Do you have a comment on his testimony?

A. Yeah, I believe his concerns and the discussions about that are valid. It's hard to determine that, whether it's confined or unconfined. But I believe the statement -- what industry is trying to achieve is we are not talking about the level that water rises in the well, we are talking about the depth that you penetrate the formation

that contains the groundwater. So that's what we are trying to achieve.

CHAIRPERSON BAILEY: Ms. Foster, is this a good place to break for public comment and lunch?

MS. FOSTER: Yes, that would be fine.

CHAIRPERSON BAILEY: Why don't we excuse Mr. Mullins until after lunch. We will check to see if any people have signed up for public comment. No, we have no one. Well, let's just reconvene at 1:00 o'clock.

(Note: The hearing stood in recess at 11:46 to 1:00)

CHAIRPERSON BAILEY: We will go back on the record. On the pre-hearing statement of the New Mexico Citizens for Clean Air and Water, both Dr. Neeper and Dr. Bartlett were named for offering technical testimony and for cross-examining witnesses. Dr. Bartlett has been unable to participate up until this time. He would now like to participate with both his testimony and his cross-examination of witnesses at the appropriate time. I just want to have that in the open so nobody is surprised when Dr. Bartlett begins cross-examining witnesses.

There has also been a notice of intention

to present rebuttal testimony filed by New Mexico Oil and Gas Association for intention to recall Dr. Bruce Buchanan to present rebuttal testimony. I believe that we will have rebuttal testimony after everybody has had a chance to present their cases so they can rebut everybody at one time. Now we will -- yes, Ms. Foster?

MS. FOSTER: Yes, Madam Chairwoman. Since we were doing housekeeping matters here, during the last day of the testimony in May there was a question that was posed by Commissioner Bloom regarding operations by Chesapeake. I think it was after the public comment of Mr. Irving Boyd. I have contacted Chesapeake and they have provided me with a letter in response to the question about closed-loop operations and I have made copies and given them to counsel, and I would like to give them to you as a comment from Chesapeake Energy in response to the question posed by Commissioner Bloom.

MR. JANTZ: Madam Chair, a quick question. Is the commission going to consider this a written public comment?

CHAIRPERSON BAILEY: It is a response to the question by the commissioner so it will be

treated as a response to a question.

MR. SMITH: I don't think it could be treated or accepted as a public comment because it was submitted after the deadline that you set last for public comment. Not this public comment but written comments, I think.

MR. JANTZ: At the same time, Madam Chair, if it is a response to the question for Commissioner Bloom, it does seem like we should have the opportunity to test the voracity of the information therein, and we are unable to do so without a witness.

MR. SMITH: I think that's right.

CHAIRPERSON BAILEY: How is it accepted then?

MR. SMITH: I think you're going to have to get the witness in for that. Is it technical testimony?

MS. FOSTER: No, it's not. It's in response to whether Chesapeake uses closed-loop systems in all their operations nation-wide. It is basically a statement that they do not and how they come to the decision to use a closed-loop system. It's a question posed by Commissioner Bloom of a laywitness, a public commenter, and the question was

left out there as to Chesapeake's operations.

MR. SMITH: So it was a follow-up on a public comment?

MS. FOSTER: A follow-up to Commissioner Bloom's question, and I did speak to Commissioner Bloom off the record asking him how he would like to respond to the question and we agreed that just a simple letter would suffice to just answer the one issue as to Chesapeake operations.

COMMISSIONER BLOOM: I think you asked me if I would be interested in knowing that, and I said sure.

MR. SMITH: I think it's too late.

CHAIRPERSON BAILEY: We have to give it back. Sorry. We can resume with Mr. Mullins' testimony on direct.

MS. FOSTER: Thank you, Madam Commissioner.

Q (By Ms. Foster) Mr. Mullins, directing your attention to your second issue, which is the air drilling/cavitation question.

A. Yes.

Q. IPANM is making another minor change in the rule in Section 19.15.17.10.1A, which I direct your attention to a specific page, Page 9 of the

IPANM application.

A. Yes.

Q. After the words "coal bed methane well" we are adding the language "or for underbalanced drilling, workover or completion operations."

A. Correct. It's not reflected on the copy that I have but we will be adding that for the reasons that we talked about. We wanted to make sure that the existing practices with cavitation and the underbalanced drilling in completion operations were not impacted.

Q. Could you please explain to the commission -- underbalanced drilling has not been discussed. Air drilling has not really been discussed at this hearing. Why is this issue important?

CHAIRPERSON BAILEY: Could you first please tell us exactly where this language should go in this 10A1?

MS. FOSTER: Yes. 10A1A on the fourth line after the words "coal bed methane well" and before "and," please add the language "or for underbalanced drilling, workover, or completion operations."

CHAIRPERSON BAILEY: Thank you.

Q. (By Ms. Foster) Mr. Mullins?
A. Yes.
Q. Air drilling as opposed to regular drilling, discussing the type of systems used.
A. As I briefly said before, especially in Northwest New Mexico we drill many of our wells through a portion of the horizons with air or natural gas or nitrogen in some instances in an underbalanced situation. Of course, nitrogen is an in earth substance. Air is nearly all nitrogen, and if we are using natural gas as a drilling medium there's not liquids in that natural gas stream. That's a dry natural gas, so it would not have the liquids of concern for potential groundwater impacts.

So current operational practices that are in place in the San Juan Basin and throughout New Mexico utilize underbalanced drilling, workover and completion fluids of air, nitrogen or natural gas, and we want to make sure that the regulation allows for a pit that might handle those instances. So that's why we are recommending that change.
Q. Moving to your concern about no liners on top, in the 2007 hearing and in some exhibits there's been discussion regarding burrito,

enchilada, taco, whatever you want to call it. Can you explain what this means?

A. Yes. The differences, under the current regulation under Rule 17, in Northwest New Mexico we do not have liners on top of the burial-in-place enclosures. In Southeast New Mexico under the current Rule 17 a liner is required on top of the trench or burial. That's the difference, I guess. The burrito or enchilada has the cover on the top. The taco does not. It only has the liner on the bottom.

What we are recommending, and based upon the modeling and the historic practices, is that we take the taco method from Northwest New Mexico. I know they make like enchiladas and burritos in the southeast but to also allow for the use of the taco closure, which was in place under the prior rule, Rule 50.

The caveat to that is we are only requesting that in areas where groundwater is greater than -- or groundwater resources are greater than 100 feet to allow for that to occur.

Q. Did you hear Dr. Buchanan's testimony regarding the amount of soil necessary to cover vegetation?

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A. I heard Dr. Buchanan's testimony and I believe it's been consistent from the first Pit Rule hearing through this one that four feet of cover has been sufficient and that agrees with my modeling work.

Q. Looking at page 24 of the IPANM petition, there's some changes recommended by IPANM to section 19.15.17.12.D6?

A. Yes.

Q. And the changes that IPANM added were pertaining to the removal of the below-grade tanks?

A. That's correct.

Q. And the situation pertaining to wet and discolored soils.

A. That's correct.

Q. The added language that IPANM is putting in there is for testing and sampling of wet and discolored soils, correct?

A. That's correct.

Q. And do you agree with this change?

A. Yes.

Q. And why would you agree with it?

A. We believe that you should test, be able to test the soil, so that's what we are recommending here at this point.

Q. Okay. But is there not a Spill Rule in New Mexico?

A. Yes, there is, but it's Rule 29 or 30. I don't recall which one offhand.

Q. And under the Spill Rule, are there not major and minor release quantifications in the rule?

A. Yes.

Q. And below which -- are you familiar with the minor spill release?

A. Yes, there's a five-barrel threshold, as I recall.

Q. Does an operator need to report if there's less than a five-barrel spill under the Spill Rule?

A. No.

Q. So this seems to be a little bit different from the Spill Rule in that you are looking at wet or discolored soils, correct?

A. Correct.

Q. And you need to report upon visual inspection of a wet or discolored soil?

A. I guess that's where we want to reduce the reporting. We want to make sure we are testing it but not necessarily having to report.

Q. Okay. Have you reviewed the OCD expert exhibits regarding reporting of wet or discolored

soils?

A. I have.

Q. And how would they be different from the IPANM recommendation as to this section?

A. I'm a little bit confused from their presentation. It appears that they are requiring reporting almost at -- maybe even an abatement plan just upon notice of discolored soil. So that's what the concern is.

Q. Well, let me clarify your language here. It's not notice of discolored soil, it's observation of discolored soil.

A. Correct.

Q. And no notice necessary?

A. That's my understanding.

Q. So one of the last concerns that you have is the common sense application supported by science and certainty that the IPANM petition wants to address?

A. Yes.

Q. Why is this important to you as an operator? Can you explain that statement?

A. Well, I believe that we need to -- especially with regard to the Pit Rule there's been a lot of characterization both in the news media

about pits and we have utilized a general term. There are different types of pits utilized in the oil and gas industry. The regulations on those pits have evolved over time and improved. And the specific concern that we have with the Pit Rule for common sense application is to be able to drill oil and gas wells and to be able to bury your cuttings in place as they are doing in Texas and other areas where it is not going to be a concern to the public health or the environment.

So we don't believe that closed-loop systems are necessarily applicable everywhere. When I use that term closed-loop system, that means to remove the cuttings and haul them to another location. So I believe the operators and the on-the-ground conditions, the presence of groundwater, the distance of siting requirements, the things that we have in the rule, will allow for regulators and operators to have a common sense approach to the Pit Rule.

Q. Now, I would like to direct your attention to variances in the rule in general. How many places or how many different times can an operator ask for a variance under the NMOGA a proposal?

A. I believe an operator can ask for a

variance three different times: At the time of application can ask for a variance; they can also ask for a variance during the operational phase; and ask for a variance during the closure phase.

Q. Why is the option of having variances in this rule important?

A. It's important because it allows the district office in the proposal that we have before us the flexibility to manage the conditions with the operator on the ground.

Q. For example, there are set time frames in the variance provisions?

A. Yes. If you can direct me to which section, that might help.

Q. Okay.

A. That's Page 43.

Q. Correct. The variance section, which is 19.15.17.15 talking about variances. So when an operator is asking for a variance, according to this proposal he needs to go through a couple of steps, correct?

A. Yes.

Q. And one of those steps is notifying the surface owner?

A. Yes. That's a burden that I don't know is

applicable because the Oil Conservation Division has the -- in my opinion has been given that authority to regulate the activity so the notice to the surface owner for every single variance which potentially could be three different variances, I don't know if that's necessary.

Q. Okay. And actually, for the commission, on Page 43 on Section A 1 -- sorry, B 3 of Section 19.15.17.15, it is red-lined Sub A, Proof of Notification of Surface Owner for the Location of the Regularly Requested Variance. That is taken out. That is an IPANM change. That should have been highlighted in yellow.

And the operator must also, under Subsection C, give the OCD a statement in detail explaining why the applicant believes that the variance will provide reasonable protection of freshwater, public health and safety, livestock and the environment. Do you agree with that statement?

A. I don't agree with the safety and livestock portion. I don't know if that's within the statutory provisions for the Oil Conservation Division.

Q. And, in fact, throughout the entire rule IPANM deleted the word "livestock"; is that correct?

A. I believe that's correct.

Q. And how about in the fencing requirements? Did we delete wildlife or livestock protection?

A. It may actually remain in that section.

Q. So can you explain, as an operator in the Northwest, how asking for a variance would impact an application that you have concurrently with the BLM?

A. Well, if the BLM is the surface owner, the way the order is written, to notify them could cause an additional conflict of jurisdictional powers between the BLM and the Oil Conservation Division. In my opinion as an operator, we like certainty. We like to report and do things properly, and I think by having the requirement of notifying the surface owner it could put us in a difficult position in trying to please two different parties and not sure where we are going to end up.

Q. Well, doesn't the BLM have an MOU with the OCD where there's one regulatory body that decides on technical issues when it comes to permitting?

A. I don't recall that off the top of my head, but likely so.

Q. All right. So if the OCD is the regulatory body and yet you have to continually have to go back to the your surface owner, the BLM, with

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additional changes, do you think that could cause a delay?

A. Yes. I believe there's still ongoing discussion, especially in the interim reclamation, that's ongoing even today about those issues. So we would like to have some certainty, so that's why we have removed that notification to the surface owner.

Q. Looking through the rule here on the closure section for the time frames, if an operator needs to have an extension on the time frame for closure, under this proposal is there an extension that could be granted?

A. Yes. As I recall, the IPANM proposal left the time-specific approval in place for the variance request, whereas I recall I think NMOGA was recommending just moving the time to the variance section.

Q. And why is it that IPANM would oppose moving that to a variance section?

A. Again, we would rather not wait 60 days on getting a variance request. We would like to know that's what the time period is and have that specified.

Q. Now, you heard me asking questions of Mr. Fanning regarding standards for operators?

A. Yes.
Q. And did you hear him say that there was a conversation with the Cattle Grower's Association?
A. I believe NMOGA had some discussions with the Cattle Grower's, yes.
Q. As a member of the IPANM Pit Rule group, were you part of those conversations?
A. No.
Q. Now, are you aware of any statutory authority that the legislature has given a body pertaining to livestock protection in New Mexico?
MS. GERHOLT: Objection. Mr. Mullins is not an attorney. I think that calls -- I actually withdraw my objection.
CHAIRPERSON BAILEY: You withdraw the objection?
MS. GERHOLT: I withdraw the objection. I thought through the rest of it.
CHAIRPERSON BAILEY: Please proceed.
Q. Are you familiar with the Livestock Board in New Mexico?
A. Yes, I am.
Q. And what would their statutory authority be, if you know?
A. I don't know specifically but I know we

have regulations that deal with livestock.

Q. Looking at Page 47 of the IPANM petition, this is Section 19.15.17.16 pertaining to additional conditions that the division may impose, IPANM put in some additional language in there that the conditions must be for the reasonable protection of freshwater as designated by the State Engineer, public health, has deleted "safety or the environment" and added the language, "provided the conditions or requirements are based on provisions of the Oil and Gas Act or current OCD regulations." Do you see that?

A. Yes. I see it under Part C.

Q. Do you agree with this change?

A. Yes.

Q. Why?

A. Well, I believe that safety again was not in the statutory authority and we are demonstrating our compliance with the conditions on the ground.

MS. FOSTER: I do not recall if I moved Exhibit 16 into evidence. I think I did. If I have done that, then I would be ready to pass the witness. I pass the witness.

CHAIRPERSON BAILEY: Mr. Carr?

CROSS-EXAMINATION

BY MR. CARR

Q. Dr. Mullins, just a couple questions.

A. Not doctor. Engineer.

Q. Engineer Mullins, you presented two models. Did either of the models take into account the chemical composition of any of the individual constituents?

A. No.

Q. One more question. If I understood your testimony a few minutes ago, you were concerned or did not think that when you were seeking an exception of variance you could notify the surface owner. Is that what you said?

A. Yes. I was concerned that it could cause more difficulty and conflict, and rather than having the regulatory certainty we desire, could actually cause more problems.

Q. Your concern is with the BLM?

A. In the instance that I discussed, yes.

Q. This deletion would also mean that you wouldn't notify an individual rancher; is that correct?

A. In this instance, that's correct. Unless they have a different agreement under the Surface Owner's Protection Act, that's correct.

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Q. All this is is a notification, a courtesy to them telling them that you are going to be seeing this change?

A. Yes.

Q. That's all I have.

CHAIRPERSON BAILEY: Mr. Jantz?

CROSS-EXAMINATION

BY MR. JANTZ

Q. Thank you, Madam Chair. Mr. Mullins, good afternoon. When you started your testimony you began by saying you reviewed the OCD records regarding contamination from pits; is that right? Did I hear that right?

A. Yes.

Q. In that database, do the records indicate what kind of pit specifically is responsible for the spill or the contamination?

A. Yes.

Q. So does it go into detail such as reserve pit, drill pit?

A. In a similar fashion. You can look at the records and it indicates whether it is an earthen production pit associated with dehydrators, separators or surface production equipment, if it is a pipeline drip, it is a pit, a number of other

possibilities, but the specific records do demonstrate what type of pit it is.

Q. Okay. And that sort of specificity, whether it's a reserve pit, drill pit, workover pit?

A. Yes, so that's why I can tell you that there are not any temporary lined reserve pits or unlined ones that dealt with the drilling operation.

Q. So let's talk about that for a minute. These are just the ones where there's evidence of some sort of contamination, whether it's soil, whatever; is that right?

A. Well, normally they were identified during the closure process, principally under the prior rule, so during the replacement or the installation of that vintage of below-grade tank, the remediation activities, that's when those reports were put together.

Q. But it doesn't necessarily mean that every instance out of the hundreds or thousands of wells or 100,000 wells in New Mexico -- that there may be contamination instances that haven't been caught?

A. I wouldn't necessarily say that. As I recall, there were over -- the BLM began, along with the Oil Conservation Division, began closure of the earthen production pits which many times there was

more than one on each location. There was one associated with the pipeline company and one associated with the oil and gas production company. In those instances, I think the original figure that I saw was close to 80,000 of those earthen pits that would have been closed under the regulations, so they would have been sampled and analyzed during that time.

So I think when you look at those particular 80,000 earthen production pits, finding 421 of them with soil contamination is not unusual.

Q. Is there an OCD inspector at each one of those closures during each one of those closures?

A. I don't know.

Q. Let's talk a little bit about your modeling. I guess it's -- bear with me just a second if you would. So your Exhibit 6, Page 5 and 6, talking about the input parameters.

A. Yes.

Q. Now, I'm assuming that for modeling purposes input parameters are fairly important; is that right?

A. That would be a fair statement.

Q. And the outputs often depend on the inputs?

A. That's correct.
Q. I imagine that that's probably the same -- that those two statements are the same for modeling contamination transport into vadose zone?
A. Yes.
Q. And the mixing zone as well?
A. If you are referencing the mixing zone in the aquifer that's a portion of this model, yes.
Q. How did your assumptions, your inputs, differ from those modeled by OCD back in 2007 for the vadose zone and the mixing zone or were they identical? Did you use the identical data?
A. Well, I tried to use the identical information in nearly every occurrence. The principal difference -- I'm trying to answer your question -- the vadose zone is different from the evaporative zone. So one of the principal differences was the 20 inches of evaporative zone at the top and I used 48 inches. So that's a difference but it's not in the vadose zone. I believe the vadose zone parameters were identical.
Q. Are mixing zone parameters identical?
A. The mixing zone depth of ten feet which I used in my modeling is the same as the ten-foot mixing zone depth that was used in the 2009 modeling

by the OCD.

Q. But not the 2007?

A. Correct. They used four inches at that time.

Q. How did you make a determination to use the ten-foot rather than the four-foot?

A. Four inches.

Q. Four inches?

A. Right. Well, there was some discussion at the 2007 hearing -- the HELP model will actually calculate what the mixing zone depth will be but the Oil Conservation Division fixed that at four inches. What that does is that leaves a higher contaminant level obviously in the four inches than if you mixed it in the top ten feet. That was pointed out at the 2007 hearing, and I believe the Oil Conservation Division made the adjustment to ten feet.

If you look at what the true mixing zone depth could be, it's obviously a time. It could be the full 63 feet of the depth of the aquifer but I used ten feet. I thought that was a conservative number that the OCD had used.

Q. But you are really not qualified to make that determination, though, are you?

A. Well, I believe I can give a good

estimate. I mean, my opinion, I would like to use the 63 feet just given what I believe the gradient difference was in the contaminant. If you have 100,000 milligrams per liter of leachate moving down, it's obviously of a higher density than the groundwater it's going to mix into. So I think gravity mixing, I think it would mix over the entire distance. That's where I commented that the four-inch interval that the OCD utilized might have been appropriate for the hydrocarbon analysis for a mixing zone, but I didn't think it was appropriate for a chloride analysis.

So ten feet, I think, is actually a very conservative number. Most models that work for groundwater will select a 10 to 15 to 20-foot probably maximum receptor. The reason they select those depths is normally the joints of casing, joints of PVC that are drilled on a water well, normally they are 20-foot joints. They are cut in slots and set a certain distance. So my analysis, looking at the Oil Conservation Division, is because of those joint dents and receptors, ten feet was a very reasonable number to use.

Q. But again, my question was, you don't really have the expertise to make the determination

whether ten feet or 63 feet is more important, do you?

A. I disagree. I could run the model. I did not run that particular instance and I believe it will calculate a depth of mixing.

Q. That's not what you testified to in 2007, is it? I mean, you conceded then that you didn't have formal training or expertise in groundwater zone or in mixing zone contaminant migration in groundwater.

A. I don't recall that.

Q. Let me refresh your recollection. If I may?

CHAIRPERSON BAILEY: Yes, you may.

Q. Read this.

MS. FOSTER: What page of the testimony, please?

MR. JANTZ: 3262 of the Pit Rule transcript in 2007. Would you read the question and answer, Mr. Mullins?

A. Yes. At this time that would have been correct.

Q. So you have been boning up since then?

A. Let me clarify this. In 2007 -- I had not run the HELP model and the Multimed models in 2007.

Since that point in time I have run all these models multiple times, so I now can answer that question yes.

Q. So you have boned up on it in the intervening four years? When before you testified you don't have any formal training or experience in mixing zone groundwater contaminant transport, now you do?

A. Yes.

Q. Based on the intervening four years and the model runs you conducted in preparation for this hearing?

A. That's correct. My testimony in 2007 dealt with -- I believe I was pointing out that the mixing zone depth was set at four inches in the model and that I didn't believe four inches at that time was appropriate for the mixing depth. I think when you look at how that has changed to the 2009 modeling that the Oil Conservation Division did, they recognized that deficiency.

Q. So let's talk about some of the inputs for your modeling this time around. You said that -- please correct me if I am mischaracterizing your testimony. For the most part you used identical inputs as the OCD used in 2007/2009?

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A. As a general statement, that's correct.
Q. But there were some differences. As I understand, one of them was infiltration rate?
A. No.
Q. No? Okay, what were the differences just to help me out here so we can get this clear for the record?
A. The differences were in the precipitation, the locations, obviously, Hobbs, Maljamar, Carlsbad, Artesia. The precipitation datasets that were utilized by the Oil Conservation Division for Hobbs in particular is different from the precipitation dataset that I utilized. And I think I commented that on a daily basis the precipitation values that I used were twice -- had twice the occurrence. I could tell you the ones that were the same.
Q. Well, is it a shorter list than the ones that are different or not?
A. It's -- I mean, those are basically -- you know, the difference was in the precipitation, the solar portion and the evaporative zone depth. That's the primary one, the difference between 20 inches and 48 inches.
Q. So maybe explain to me what goes into the infiltration rate. Because isn't precipitation one

of the ingredients in determining the infiltration rate?

A. Correct. It's the original input that goes in, and obviously -- let's start with rain water, for instance. So it's raining. The rain hits the ground. Some of the water runs off the surface of the ground. That's the surface slope. The rest of it is starting to sink into the ground. Some of it is absorbed by the plant material that is present. Then it dries out. The sun comes up the next morning, sets at night. That water dries out or moves, and the information that I'm presenting is that the end result of the HELP model that includes all the items on Page 5 of this exhibit, the end result of that is the infiltration rate, which is the net water that moves below the pit.

Q. So let me see if I understand what you are saying then. Even though you did change some of the inputs into the HELP model which gives you your infiltration rate -- so you put all the inputs in the HELP model. The output of the HELP model is the infiltration rate?

A. Correct.

Q. Was the infiltration rate from the HELP model identical to the infiltration rate that the

OCD calculated back in 2007?

A. It was on the cases that I utilized their exact input data. I was able to duplicate that.

Q. So you did duplicate it?

A. Yes.

Q. But for the purposes of your testimony today and your new recommendations you did change the precipitation values against the solar radiation values, the evaporative rate values, so you did get a different output from the HELP model than Oil Conservation Division did?

A. The main difference that caused the change is the difference in the evaporative zone depth from 20 inches to 48 inches. The other general precipitation numbers were about the same. I mean, I think it was 16 inches of Hobbs precipitation and I have 18 inches in my model. The numbers were, you know, comparable. So I'm not sure of your question, if you could repeat it.

Q. Yeah, so my question is maybe those inputs, those initial inputs in the HELP model may have been comparable except for the evaporation zone, but your output, which was the infiltration rate, was different from what OCD arrived at in 2007/2009?

A. Correct. The principal reason for that is the difference in the evaporative zone depth.

Q. And the evaporative zone, is that different from mixing zone and vadose zone?

A. That's correct.

Q. What is the evaporative zone then?

A. As I testified earlier, at the top part of the soil column in the particular HELP model, the representation was that the top six inches was a root zone where grass would grow. As Dr. Buchanan testified to, roots can extend and shrubs, I believe it was, up to six feet. The evaporative zone is the depth of the soil. It is always greater than the root zone of six inches, but it is that depth in the soil column where water can evaporate and basically move up. So the Oil Conservation Division utilized 20 inches in their analysis and I utilized 48 inches, which is the full cover of the soil material. And the reason I limited it to 48 inches rather than using a higher value is because that is the cover material. We are basically placing new cover material and depositing it on top of our pit location, then planting our vegetation on top of that. So that interval, obviously, has been more recently disturbed and so it is available for more

evaporation, has a little more porosity value in it because it hasn't been packed geologically over time.

Q. So is the thickness of the evaporation zone the only variable you changed?

A. No, that's the principal variable. Obviously, the --

Q. In terms of the evaporative zone. Because it sounds to me like porosity is another variable.

A. It's the same. Porosity was the same, soil texture was the same, wilting point was the same, hydraulic conductivity was the same. Every other valuable was the same.

Q. Same as the OCD?

A. That's correct. I tried not to get into the discussion of that.

Q. I appreciate that for sure. When you do your inputs, these are based on data from USGS in some cases? Let me see, weather service? Like the weather data, precipitation data, those are publicly available documents; is that right?

A. I obtained the data from the U.S. Climate Data Network, yes. It's publicly available information.

Q. Okay. There are instances, at least 400,

of pits that have contaminated soil. Some have contaminated groundwater. They may not be lined pits, as you see?

A. I'm not sure that's correct. I'm still not aware of a pit contaminating groundwater that's -- especially a temporary reserve pit.

Q. We will leave the testimony as it is with respect to that. However, why didn't you take the actual data from one of these existing pits and use those as the inputs for your model and see if you could replicate what happened on the ground?

A. Well, I think my modeling almost does that. If you look at the study that was performed by ConocoPhillips that Dr. Buchanan worked on and presented, he analyzed it. I believe it was a pit that had been an unlined earthen temporary reserve pit that had been in place for years. If you look at the -- it's an electrical conductivity profile of the soil. He has a background profile and then a profile of the soil, and I think that representation of that exact occurrence models well and fits well with what I have presented.

Q. But you did say that you almost did that. Why not actually do that? Why not actually take all of the variables from a situation where a pit has

led to soil contamination, perhaps groundwater contamination -- I know that's under dispute -- and essentially reverse-engineer that and see how that works with your model, see if you can get an accurate modeling based on that?

A. I believe you could approach that and do a site-specific model. Obviously, engineers like data and the more data you have, the more information and more accurate site-specific information you can place into the model. The purpose of the model that I have prepared and had presented, and I think the models that had been presented previously, give a very good representation of what would occur under those scenarios. Not an exact figure but a very good representation.

Q. Did you, in the course of modeling, did you take a look at the -- and maybe this is building on Mr. Carr's question. Did you take into account any of the unique transport characteristics of particular contaminants, for example NAPLs?

A. No, I didn't. I modeled chlorides. I did not model the salt portion specifically but you may recall that I did not -- in my modeling I did not allow for any decay, for any retention or dispersivity, so I only allowed the contaminant to

fully moved rather than to be retained.

Q. What were the liner installation assumptions that you used for your model?

A. I might have to refer to one of my exhibits in order to answer that question. First statement, I utilized the same liner criteria and parameters as has been used in both the 2007 and 2009 presentations.

Q. Which ones were those because there were several? There were good installation scenarios and poor installation scenarios.

A. That is correct with regard to the liner quality.

Q. Yes.

A. I utilized what would be called the good, in relation to the prior hearings, the good liner installation, not the poor installation or the unlined situation which were the prior two. And the information that's associated with that on liner deficiencies that I modeled was a pinhole density of one hole per acre and installation defects of four holes per acre. So I modeled the same liner defect conditions as occurred in 2007, 2009 and 2012. They were all the same.

The Soil Texture No. 36 in the HELP model

was the liner material that I utilized with the same thickness of .02 inches.

Q. That was the same as in 2007, 2009?

A. Correct, and the same hydraulic conductivity.

Q. Let's talk a little bit about -- and I just -- hopefully this part will be brief. You talked about the increased costs of using closed-loop systems for the Pit Rule versus pre-Pit Rule, and if I recall your testimony correctly, you said that in some cases the Pit Rule will cause drillers to forego permanently a resource. You do drilling; is that right?

A. Yes.

Q. Have you ever permanently foregone a resource because of the Pit Rule?

A. As a matter of fact, yes.

Q. Do you have the documentation for that?

A. Well, I presented that documentation in the 2007 --

Q. Before the Pit Rule was actually enacted?

A. No. I presented that information at the 2007 Pit Rule hearing about a shallow Fruitland Coal well program at a 900-foot development depth and what the added cost would be to that program. When

you look at the added cost in conjunction, obviously, with some of the commodity price activities, we have had to discontinue that program, weren't able to drill the wells and those leases expired and returned back to the federal government.

Q. But that doesn't mean somebody else couldn't lease those when the commodity price rises again and drill profitably?

A. That's possible, but in my instance I suffered that.

Q. But you understand the Pit Rule isn't meant to satisfy the interest of particular drillers; it's meant to make sure there's no waste and protect correlative rights overall?

A. I understand that. In my particular instance you could argue it wasted the development of that resource.

Q. For your company, not for the State of New Mexico?

A. In my particular situation, yes.

Q. Let's talk about confinement. We talked a little bit about the definition of confined aquifers. I was confused because I didn't quite understand your interpretation of the definition of confinement versus Mr. Arthur's definition of

confined aquifer, confined groundwater. My understanding, and I believe this is the understanding that Mr. Arthur had, was that the confined aquifer is an aquifer that has an impermeable layer above or below the groundwater; is that right?

A. In general, I believe most aquifers would have some sort of impermeable layer above -- at least above. They may not necessarily have one below, but I believe what I testified to earlier is that I recognize the concern that has been brought up, that industry's desire and the clarification, the purpose of why I believe the term confined was being used versus unconfined is we did not want to have the depth to groundwater be determined as the level that the water might rise to within a well.

Q. Couldn't you just say that in the definition of depth to groundwater?

A. That might be the solution that the commission works with on that, and I believe that would work well.

Q. So I guess in the course of your modeling you didn't take into account whether an aquifer is confined or not?

A. In my particular instance, whether it was

confined or unconfined, it was the aquifer at that depth. I would suspect that it has a ceiling strata above it.

Q. Just actually going back to the modeling for a minute, did you calculate any preferred pathway? Did you model any kind of preferred pathways, fractures, faults, root systems, anything like that?

A. No, I did not. I believe the HELP model in that top six-inch interval slightly speeds the movement of fluid down that first six inches.

Q. So going back, do you have in any of your exhibits any AFE? Is that what they are called?

A. Authority for expenditures?

Q. Yes, do you have any of those as an example of itemized costs of the Pit Rule?

A. I did not bring any of those in this hearing. I believe I presented that information in 2007.

Q. Before the Pit Rule was actually --

A. At the 2007 Pit Rule hearing in relation to the 900-foot shallow Fruitland coal wells, what those costs and burdens would be.

Q. But you don't have any actual operational AFEs here?

A. That's correct.
Q. In the waste concentration or contaminant concentration Tables 1 and 2 --
A. Of the rule?
Q. Of the proposed rule, yes. Let me find the page.
A. Page 41 of the IPANM version.
Q. Were you one of the people that worked on this for IPANM?
A. Yes.
Q. Can you tell me what the rationale is that IPANM used to arrive at these numbers? For example, in terms of the Benzene it's 50 times higher than the current levels for Benzene concentration in the Pit Rule. How did IPANM arrive at that number?
A. Well, we worked with NMOGA and their positions on those figures. Obviously, that's why we have two different organizations, because some of the organizations may want to request higher thresholds than others. I indicated that I was comfortable having a higher Benzene threshold. For instance, we had quite a bit of discussion about what was workable and we ended up with these numbers.
Q. What do you mean by workable?

A. Well, with regard to specifically chloride, for instance, which has probably been -- you can pick one of them. That's been one of the larger items of concern. Chloride itself is not a contaminant. We looked at -- it really comes in two parts. I guess I want to take a step back.

Q. Okay.

A. In 2007 the modeling testimony of Daniel B Stephens, he reverse-engineered the figure. So he came up with the vadose zone depth of 50 feet. Remember the 2007 hearing was the 50-foot focus. And so he said what concentration will not exceed groundwater quality standards right underneath the pit, not laterally but underneath the pit, at a three to one mixing ratio. And he reverse-engineered that with the VDSAT model and came up with a figure of 4960.

The Oil Conservation Division was also recommending initially in the 2007 Pit Rule hearing the 5,000 milligrams per liter SPLP threshold. So we took those numbers obviously into consideration in addition to modeling work that I had done and looking at the chloride levels and that's how we set that threshold.

Now, in the less depth -- for instance,

Table 1 as lower the standard, make it the closer you are to groundwater, instead of 5,000 milligrams per liter he said well, half that number, 2500 milligrams per liter would be acceptable in that instance. And that level, 2500 milligrams per liter, is sufficient in Northwest New Mexico. I mean, by probably an order of magnitude you're not going to encounter that. Where it comes into play is in Southeast New Mexico. So we worked with those levels to come up with what's protective.

So in my modeling, which I can talk about specifically, I modeled the threshold at 5,000 milligrams per liter SPLP which relates to 100,000 milligrams per liter of leachate coming out of the bottom of the pit which at a three to one mixing ratio would relate to 400,000 milligrams per kilogram in the raw drill cut. So that's -- we looked at that based upon the sampling and the protection and worked it backwards, worked it forwards to ensure that that standard was protected. So that's how we arrived at the number.

Q. So if I understand you correctly basically, say, the 5,000 for chloride was based on the initial proposals by industry and OCD back in 2007?

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A. We tried not to deviate significantly or really in any manner from what had been presented previously and had been supported by the evidence and the testimony. So the 5,000 milligrams per liter was supported in 2007 by both the OCD and industry. It was 4960, basically 5,000.

Q. Close enough.

A. So it was jointly supported I believe until about the last day of the hearing. I'm not sure how it changed.

Q. But the commission didn't support it, did it?

A. The commission did not write the rule with that level in place but that's what the modeling and the testimony that was presented -- you can look at the conclusion slides of both parties and I believe it states that.

Q. Was this process, looking back at the proposals from 2007, is that how you arrived at each of the other contamination limits? For example, the TPH, total TPH 100 milligrams per kilogram for soil that's 50 feet or less?

A. As I recall, there were discussions with, in particular, Bruce Gantner who was on the team, and those thresholds were workable and protective.

So that's -- I obviously was arguing for some higher thresholds but I didn't get my way.

Q. Sometimes that happens. But I guess my question was: Were the remainder of these contaminant concentrations, TPH, BTEX, Benzene, were those based on the recommendations from the NMOGA industry committee and IPANM back in 2007?

A. Just off the top of my head, I don't recall on those ones in particular. I know they are definitely similar.

Q. Similar.

A. I would have to pull out, you know, the numbers to look. Particularly in Benzene. I would definitely push for a much higher standard and I don't get my way.

Q. How much higher would you go?

A. I think I was recommending -- well, let me be careful. I would defer to Dr. Thomas' testimony, but with regard to contaminant movement I do not anticipate the movement of hydrocarbons as readily in the scenario that we are modeling, specifically because there's wettability of the soils as you move oil or hydrocarbons phase through water-saturated rock. It's either oil wet or water wet and the retention of those hydrocarbon constituents can be

substantial. I mean, that's why when we remediate oil contaminated soil we tend to roll other clean soils in with that to mix it up.

Q. But you didn't end up modeling Benzene or BTEX?

A. No, I did not because I don't think they would move. Their mobility and migration in this instance would be dramatically lower.

Q. Have you ever done any modeling on any hydrocarbons, either DNAPL or LNAPL?

A. I have not. I have done a significant amount of reading about that. You know, obviously, there's some contamination cases here in New Mexico at the Air Force Base in Albuquerque. But again, we are looking at a different model of movement of some of those things than movement through the vadose zone.

Q. So you didn't really --

A. And if you look at the volatilization and degradation of hydrocarbons, most of them were volatilized. They break down and evaporate to the atmosphere, which when you place a liner, especially in New Mexico's climate, when you place a liner on top of the pit contents it prevents that volatilization and removal of the constituents.

Q. Now, did you take into account when you were making recommendations to the Independent Producers working group and the working group that joined with NMOGA and the IPANM working group, did you take that volatilization into account?

A. I can tell you I asked about it and I believe the numbers we have are protective of human health and the environment. I believe much higher figures would be protective.

Q. But you didn't personally do any calculation about volatilization, how much is lost to volatilization?

A. I'm trying to remember the -- it's called the residence time of Benzene and it's very low. It's in the hour range. I can't remember if it's more than -- these evaporate is what I am saying. Benzene in particular, unless it's confined.

Q. Did you have any input into the setbacks, the setback provisions for this rule?

A. Yes.

Q. And I'm talking about setbacks from both surface waters and residences in addition to those from groundwater. Did you have any input on either or all of those setbacks?

A. Yes.

Q. In terms of the setbacks from surface water, did you take into -- what factors did you take into account when you determined setbacks from surface water?

A. I believe the main focus -- again, I'm an operator in Northwest New Mexico and our focus -- because we also added the low chloride fluid definition in conjunction with the siting requirement reduction, especially for localized drilling fluids, we took into account the risk of that contaminant. And in relation to surface bodies of water there aren't that many bodies of water up in Northwest New Mexico but that was our concern about the definition, what an arroyo, ephemeral stream, all sorts of things in there. That's why we wanted that clarification in certainty there combined with the siting requirements because they kind of go hand in hand. It would be a workable -- more workable solution for industry to allow us to balance being able to drill on existing well pads. That was one of the biggest concerns we had is we had infrastructure in place on the ground where we weren't able to access and drill.

Q. So one of the considerations that you looked at when fashioning the proposed amendments to

the Pit Rule was what infrastructure was already in place? Is that what you were just saying?

A. No, I had we had discussions about the impacts obviously of the existing Pit Rule and the challenges of working with that. And one of the items that came up continually, especially in the northwest, was the siting requirements. So we looked at -- and I tried to look at specifically in my modeling the most restrictive siting requirement case, which was 100 feet. And looking at that and the time frames involved, is it leads me to believe why we should have the rule in the first place, but maybe we should go back to Rule 50. It leads you to that discussion because Rule 50 had protections in place for vulnerable areas and areas around rivers and streams and that sort of thing.

Q. So did you look at any studies or data from New Mexico or any other state about situations where surface water may have been contaminated by a pit from flooding? I mean, I guess North Dakota might be a good example.

A. I did not.

Q. Did that come up in the discussions?

A. I don't believe it came up in discussions. I'm aware obviously of the instances where pits have

overflowed but that's been -- that's a spill. That's not what we are talking about when we are modeling the long-term fate transport of contaminants that are buried in the oil and gas reserve pit. That's a very, very unfortunate incident of operation activity, and I'm sure in those instances they remediated that to the best of their ability.

Q. So actually I want to go back to your model again. Would your model encompass a situation of in a multi-well fluid management, these enormous pits could be greater than ten acre feet? There's been testimony they could be as much as 40 or 50-acre feet of fluids. Did your modeling take into account those situations?

A. No, it does not, because that will be modeling storing liquid in a multi-well fluid management pit. What I am modeling is the burying of the drilling fluids in a temporary drilling. They are different animals.

Q. I want to get one more point for clarification and then I think I will be done. In your discussion about notification to the surface owners for variances, you said it wouldn't be -- you talked about conflicting jurisdictions between BLM,

I guess, and New Mexico. But isn't that a legal conclusion?

A. I've just encountered in my experience that when I am required to notify another party it tends to go beyond their notification and suddenly involves their involvement in the matter. I, as an operator, and I believe as an industry, we want to do what's right and we want to report to the governing authority, and I think in instances where that notification is mandated it could cause additional delay and difficulty in either remediating a situation, because I am now -- if the surface owner comes in and says well, do this, and the regulatory body is saying do this, I am in a no-win situation. I can argue well, I just notified the surface owner and the surface owner might say, "Well, I'm just going to notify my attorney."

Where does that leave me in the situation? I'm trying to comply and do what's -- follow the regulation and do what's appropriate. And that's what I want to do, and I think this opens up that box.

Q. So from the industry perspective, notification to the surface owner isn't necessary or desirable?

A. I believe the Oil Conservation Division has the authority to regulate the operator.

Q. But do you think you could see where it may be necessary and desirable from the view of the surface owner?

A. I could see where certain surface owner agreements may have those provisions and I think they would be involved in those situations.

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

CHAIRPERSON BAILEY: Ms. Gerholt? Wait. Let's take a ten-minute break.

(Note: The hearing stood in recess at 2:17 to 2:30.)

CHAIRPERSON BAILEY: Mr. Jantz has concluded his cross-examination. We are ready for Ms. Gerholt to begin her cross-examination of Mr. Mullins.

CROSS-EXAMINATION

BY MS. GERHOLT

Q. Mr. Mullins, as you see, the OCD exhibit book is before you. If I could have you turn to Exhibit 2 within the Oil Conservation Division notebook. If I could also request of you to have IPANM's May 15th modifications before you to have

comparison.

A. I have them both.

Q. Directing your attention to Page 4 of the OCD's proposed modifications, and specifically 19.15.17.9, Notification Required. If you will read the small print in that box.

A. In the comment box?

Q. In the comment box?

A. Yes. "An operator shall use a C-101, C-103 or applicable BLM form to notify the appropriate division district office of construction or use of a closed-loop system." Part B -- that was Part A section. Part B is "A closed-loop system shall use appropriate engineering principles and practices and follow applicable manufacturer's requirements or the equivalent thereto."

Q. Mr. Mullins, does this agree with IPANM's suggestion notification requirement for closed-loop systems?

A. I don't believe it does fully. I think the portion that deals with the closed-loop system shall use appropriate engineering principles and practices, the B section, I think we were asking that be removed. I believe NMOGA had that in theirs.

Q. Okay. But the Division and IPANM are in agreement that closed-loop systems should be -- you are using one to notify, using the permit or register?

A. Correct. Section A, I believe IPANM agrees with and Section B is where we had the concern.

Q. Then if I could draw your attention to IPANM's filing, Page 1, definition of a closed-loop system. I just have a clarification question. On direct it was unclear to me. Is IPANM requesting that "or workover fluid" be deleted from the definition or are they requesting that "or workover fluid" remain in the definition?

A. I guess that has two pieces to it. To a certain degree, it needs to be in the rule, and to a certain degree the workover operation or the pump changes or the various day-to-day maintenance type activities, you may have some workover fluids in use with them, but concurrently we are having to file C 144 EZ forms.

Q. If I could stop you right there. Isn't it that you have to file a C 144 EZ because currently closed-loop systems are permitted?

A. My understanding in my practice is with

the office up in Aztec and when we are utilizing tanks out on the -- which every time we put a rig on a well we have a rig pit, a small -- it varies in volume, a rectangular square tank. And the concern is that it's a tank. It's out on location. It has fluids that are going to be put in it. Do you want to get in trouble with the Oil Conservation Division or do you need to file a C 144 EZ form saying, "I'm out here doing this workover operation because I have a tank out here. All I'm putting in it most likely is produced water that's coming from the well."

The well may be flowing back and I am working within that tank rather than the well. Then when I am done with the well I haul the fluids off like I normally do and dispose of them. But if an OCD inspector should show up on my well location and I don't have a C 144 EZ form, my understanding is I am not in compliance with the current Pit Rule.

Q. Okay. But the current Pit Rule does require closed-loop systems to be permitted?

A. Right. Under that definition. That's where I have the concern about closed-loop systems being solids control equipment, dealing with the solids and where the solids end up, whether they end

up on that location or are they hauled off to some other facility. And under the current Pit Rule, we are burdening the -- my understanding of the rule, I am filing a C 144 Form EZ when I move from pump change to pump change to pump change to pump change. I am moving every single day. Sometimes I move from more than one well in a day with the same operation.

And that's what I mean that that was an unintended consequence of the prior Pit Rule where everything is being handled as it normally has. There's not any debris, solids or liquids being left on the well location. But if I don't file the C 144 EZ form I am not in compliance and I want to be in compliance.

MS. FOSTER: This is extremely awkward. He has his back to the commission and he is twisted around in the witness seat. Could I ask Ms. Gerholt if she has more questions to get in front of the question so the witness can speak to both the commission and the attorney at the same time?

MS. GERHOLT: I can move.

Q (By Ms. Gerholt) Mr. Mullins, I heard you testify today that it's important to have clarity in the rule so the regulated body and the regulator both understand what's required of them; is that

correct?

A. Yes.

Q. And would you agree with me that having clear and concise definitions is important for that?

A. Yes.

Q. And if I could draw your attention to Page 3 of OCD's Exhibit 2.

A. Yes.

Q. The definition for significant watercourse. Again, the small box to the right.

A. Is that Comment Box A5?

Q. Yes, sir, it is. After you have had a moment to read that to yourself, would you say that that is a clear definition?

A. I don't know what a watercourse is and I guess that's why --

Q. If I could then draw your attention to IPANM's exhibit, Page 3 and looking at IPANM's definition for significant watercourse, isn't it correct that IPANM also uses watercourse in the definition?

A. Yes.

Q. So if that needs to be clarified it would need to be clarified in all of the proposed modifications?

A. I would say so, yes.
Q. If I could then request you turn to Page 43 of the Oil Conservation Division's proposed modification and then also to Page 43 of IPANM's proposed modifications.
A. Yes, I have them both out.
Q. There are similarities between the two proposed modifications, correct?
A. Yes.
Q. And you would agree that an exception is an exception granted by the Environmental Bureau in Santa Fe to depart from permanent pit requirements; is that correct?
A. Yes. I believe at least on the permanent pits every one is on the same page as that being the same thing.
Q. And then a variance would be authorization from the district office for anything other than a permanent pit; is that correct?
A. Yes, I believe that's the desire is to have the local offices be able to grant variances.
Q. My first question to you is in regards to IPANM's suggested language of reasonable, so specifically Paragraph B as in boy, 2.
A. Yes.

Q. Reasonable protection.
A. Instead of equal or better.
Q. What is reasonable?
A. I think that reasonable would have to be looked at on the site-specific basis for that particular variance. The question becomes -- I think the concern we had is equal or better. There may be an instance I could foresee where you could not achieve equal or better protection but you could achieve some reasonable level of protection, so I think that was the reason for that.
Q. I realize this is putting you on the spot.
A. I'm not an attorney.
Q. No, I understand.
A. I know we are on that cusp there.
Q. I understand that. I know I am putting you on the spot. Do you have a specific example you can think of?
A. If I think about it for a longer than anyone wants to sit here, I could probably come up with one.
Q. Fair enough. Now drawing your attention back to OCD's Exhibit B as in Boy, 3A, the notice requirement to the surface owner.
A. Yes.

Q. Paragraph 3 states that "If the division district office denies the requested variance or fails to grant the requested variance, an operator may file an application for hearing." Is that correct?

A. Yes.

Q. So notice to the surface owner of a variance would only go out if either the division has denied the request or has failed to act; is that correct?

A. It appears to be that if they have denied the request, yes.

Q. I have no further questions for you, Mr. Mullins.

CHAIRPERSON BAILEY: Mr. Dangler? Do you have questions for the witness?

MR. DANGLER: Yes, Madam Chair.

CROSS-EXAMINATION

BY MR. DANGLER

Q. Mr. Mullins.

A. Good afternoon. We are in the afternoon already.

Q. Yes, we are. Let me ask the Chair a question, too.

MR. DANGLER: There is a rebuttal exhibit

and I heard you say we were going to handle rebuttal all at once. Would that include Mr. Mullins discussing the rebuttal exhibit or should I ask those questions now?

CHAIRPERSON BAILEY: He is presenting direct testimony which rebuts previous testimony. As part of his direct testimony, that's fine.

MR. DANGLER: I didn't want to jump ahead of the horse.

Q. Let's start with that then, if you wouldn't mind, which is Exhibit 16. I would like to talk to you a little bit about Page 3.

A. Okay. If you will give me just a minute I will get that exhibit up.

Q. I'm not sure how the order goes but it appears to be in the back of my packet. Rig count monthly averages?

MS. FOSTER: Madam Chair, this is not this witness' exhibit. This is Mr. Scott's Exhibit. Mr. Mullins' Exhibit is 16.

MR. DANGLER: Thank you for that clarification.

Q. I heard you say something that I thought was pretty interesting and I want to make sure that I understood what you were saying. We are talking

now about your model. I thought what I heard you say when you talked about the dailies was that in previous modeling they had taken all the high numbers and that you had tried to take a more average kind of number. Was I hearing correctly?

A. No, I don't think you heard me correctly. I think I have a slide, Slide 7, where I tried to discuss what we are dealing with here are the input parameters to the HELP model and specifically the climatological datasets that were utilized by the Oil Conservation Division and then the ones that I utilized. So that's where we are focusing on.

The Oil Conservation Division used actual data for Hobbs, New Mexico for 50 years, from 1951 through 2000. They did that for precipitation and they did that for temperature. I believe average mean temperature for the day. Obviously, there's a high temperature and a low temperature for the day.

They took that dataset, combined with solar inputs, the humidity inputs -- which are not daily, they are input on a quarterly basis -- to generate a synthetic or 50 years of synthetic data to build a distribution. Out of that distribution comes water movement that goes into the model to represent what an average yearly infiltration rate,

or which is the output, how much water comes out, averaged over 50 years based on that data. That's what the Oil Conservation Division used in their setup.

I used the monthly average temperature and precipitation information for each of those specific locations: Hobbs, Maljamar, Roswell, Carlsbad and Artesia. The monthly data is then converted to daily data because the HELP model works in daily data points and it generates a synthetic based upon the sun and everything in place, and your output is an infiltration rate, so many inches per year.

Those were the two different techniques. They mirror the same design criteria. What I was stating is that the distribution, the peak on the distribution, rather than using the actual daily data for 50 years because maybe we are in a dry spell and maybe we are in a wet spell for 50 years, the generation of a synthetic allows for a wider range of possibilities so that's what I utilized in mine as opposed to just utilizing the Oil Conservation Division data. I made some runs with that but I didn't bring those ones here today.

Q. I wrote down the words "highest parameters," and maybe it was more of a throw-away

comment that you made, and it may have had to do with the locations. But what I got the sense of from that was that you were somewhat critical of using kind of worse case scenarios all the way through and that you were trying to take a more reasoned approach to the inputs. That's kind of the overall sense that I got from listening to you. Was I wrong on that?

A. I believe that would be a fair statement.

Q. And you're a businessman.

A. Yes.

Q. And you have to make decisions all the time maybe on these wonderful AFEs that we have heard about. You have to make decisions, correct?

A. Yes.

Q. And you have to make a certain risk assessment decision?

A. Yes.

Q. And generally speaking, those risk assessment decisions are based on a business cycle; is that fair to say?

A. I think the business cycle is one portion. I think that we are all in business to mitigate the risks that are involved, whether -- at whatever level. And we want to do that in the most

appropriate manner.

Q. Right. Let me ask you a couple questions. Have you had experience as a regulator?

A. No.

Q. Have you had experience in insurance, in the insurance industry?

A. No.

Q. When you are doing your risk assessment, I think you said on cross that you use the good model of the liner?

A. And good was a relative term. It was --

Q. As opposed to bad or no liner?

A. It effectively dealt with a specific numerical value of defects or pinholes in a liner.

Q. Okay.

A. And I use the same terms that the Oil Conservation Division used. It would qualify in their good category.

Q. So you are essentially crediting your model with that liner?

A. I believe that the liner installations that the industry is using, in addition to the increased liner thickness, we have what I would call the good liner installation for this model.

Q. And are you aware that the EPA and most

regulators require you to have liner failure in your model?

A. I recall that in many instances you model without the liner being present as a background, for instance. So if you model these models without the liner present it makes a very minor difference in the calculations because of the flow through the vadose zone. We are talking about a liner of .02 inches in thickness. I believe from the standpoint of why we have liners, it's to hold the liquids, not necessarily for any solids transport related issue. I mean, the contaminant will move through the solid liner.

Q. Let me ask you this: Have you had other risk assessment training besides what might be considered for this?

A. Other than dealing with the risks of being in business every single day and then specifically the oil and gas business, dealing with the regulations of the Spill Rule, the Pit Rule, the two grams per horsepower hour on my pump jack engines, from one thing to the next it's a full-time job dealing with the risks of being in this business.

Q. That makes sense, but no formal risk assessment training?

A. I'm not aware that's there is any. I have done Monte Carlo distribution, you know, statistics stuff that normally is in my engineering training and regular work.

Q. Because I also heard you say on cross that although you are aware about the flooding that happened in North Dakota. That wasn't considered in your models either?

A. Correct, because I am modeling -- we are looking at two different items. I mean, I guess that's my short answer for that.

Q. That did have to do with pits?

A. It did have to do with pits, but it dealt with an oncoming volume. But if I was going to make a back-of-the-envelope calculation you would obviously look at the contaminant being the volume of the pit, liquids and solids, and then you would bring in the runoff water of whatever quality and type, and obviously those two are mixing together. I'm assuming that at the end of the day -- and I don't know this, but up in North Dakota I would assume the solids were probably in the bottom of the pit. The solids that were there originally might be in the bottom of the pit. The liquid portion, I think, obviously had been deleted and --

Q. Sent to the fields?

A. Went different places. I would hope that we are not constructing -- and I think under the current rule, both the current rule and the proposed rule, we are not constructing any sort of burial-in-place temporary pits in any sort of flood plane condition like occurred in North Dakota. That's one of the reasons we have the definitions that we do.

Q. And I did hear you say that you didn't really examine the contaminants and maybe their effects on each other?

A. No, I utilized chloride as the most mobile constituent in the modeling as it has been done previously, but I didn't test specifically for barium or arsenic or those sorts of things in particular.

Q. One other question but I can't remember right now. It appears from your answers to these questions that your model is not based on worse case scenarios but based on kind of an average, a norm.

A. I don't think that's correct. The HELP model distribution, you put in -- for instance, we use the average. Let me turn to the specifics. For instance, you have the annual average precipitation

in Carlsbad being on this Slide No. 9, being 14.1 inches. That doesn't mean that on an annualized basis over 50 years and we could look to the model runs that there wasn't, I don't know, 22 inches of total precipitation for that year when you look at the output file run. That's one of the differences between the OCD and my model. Theirs is the exact amount every single day for those 50 years. Mine allows for higher figures to be put in, so I think it gives you a distribution. Your output gives you a distribution. So when the infiltration rate is determined, that's the average infiltration and there's a standard deviation associated with that.

Q. Now, the runoff event that happened in North Dakota, that's an extraordinary event. I think even North Dakota recognizes that they had a particularly really bad snow melt and it flooded everything. So that's a pretty extraordinary even. Wouldn't you say with the advent of fracking technology and what we are trying to know in oil fields, fractures might be considered a more mundane and common event?

A. I guess I'm not following your question because you're discussing fracturing.

MS. FOSTER: Madam Chairwoman, I'm going

to object to the line of questioning. If he wants to get into hydraulic fracking, we are here for the Pit Rule so I am curious to know what his questions are but this has to do with the Pit Rule.

CHAIRPERSON BAILEY: Please rephrase.

Q. This would just be common knowledge that we are in a period of time when fracking is being utilized. I'm not trying to get into the controversy of fracking. That's not where I am trying to go.

A. Well, I believe hydraulic fracturing, especially in the state of New Mexico, has been going on for 50 years. I mean, some of the first hydraulic fracturing was done in the San Juan Basin. We have even got a nuclear bomb that we set off at project Gasbuggy in the San Juan Basin.

Q. That question then is the predicate to that. Fracturing under the ground of all sorts would be a more common event than the flooding in North Dakota.

A. I guess I would answer that by saying hydraulic fracturing, that process, is utilized in nearly every well drilled in the Continental United States and obviously it's being utilized more so in some of the shale gas developments and shale oil.

Q. And if I understood your testimony, you did not consider fractures in your modeling?

A. That is correct, except for you're talking about a difference between hydraulic fracturing and fractures. When you are looking at the term that Mr. Jantz used, preferential pathways, with regard to soil, those were not considered. There were no preferential pathways in the top four feet plus the top twelve and a half feet of the waste and then the vadose zone portion until it gets to the groundwater. I'm not aware of any fractures there.

But if you look at if there was a fracture in the vadose zone, it would make no difference in the movement of the fluid. It would just sit there. It would be fracture.

Now, if you had liquid, if you had a hydraulic head it would be a different situation, but you don't have that occurrence through the vadose zone portion.

Q. So if there were one of these pockets of liquid that sometimes exists and the chemicals got into those pockets of liquid, then they could move much faster?

A. I don't think that's correct in your statement or the representation that I have put

forth.

Q. As I understood your testimony, and there was a question about it before you were qualified, the modeling that you have done is the modeling that you are familiar with. You don't have other familiarity with modeling?

A. I have other models that I run. I run the Aries model daily, which is an oil and gas modeling of production and performance. So I utilize that. There's several other different production models that I've run, more geared towards production of oil and gas.

Now, the vadose zone modeling, I have looked at the modeling that Dr. Stephens has done, which he used the VADSET model and reverse-engineered that, but I didn't think -- I thought it was more appropriate to utilize the same modeling system parameters that the Oil Conservation Division had used.

Q. My question is a little broader about the modeling. That is, are you aware of modeling success rates in predicting actual events and modeling failures? Are you aware of those?

A. I guess I'm not sure about your question in regard to what subject matter. I believe models

are a very good tool in predicting future performance.

Q. So you are aware of Los Alamos modeling, the modeling they have done?

A. I'm aware of some of that. I'm aware of the groundwater issue up there in general, but not specifics.

Q. And they have done some fairly substantial modeling that will suggest that nothing would get through of 1300 feet that they have between them and their groundwater?

MS. FOSTER: Madam Chairwoman, the witness stated he is not aware of the specifics of the Los Alamos modeling. While I don't want to question the statement Mr. Dangler just made, I don't know whether the facts that he just put forward are actually accurate. The witness can't testify to that. I would object to the question concerning the Los Alamos modeling.

MR. DANGLER: I could ask one more question in this line and end it.

CHAIRPERSON BAILEY: And the witness may answer that he does not know the answer if he doesn't.

Q. (By Mr. Dangler) Are you aware that Los

Alamos admitted there has been groundwater contamination?

A. I don't know.

Q. Since you are not aware of that, let me ask you if you are aware of the alleged plume that I have discussed before and you have been here to hear me ask the questions before, the alleged plume taking place not far from Hobbs right now in the New Mexico Environmental Department?

A. I heard you mentioned that but I don't know anything more than what you just mentioned.

Q. Okay. But it might be important to you to know whether models actually reflect what's real?

A. Well, I believe it's appropriate when you go into running a model, and that was my testimony about you need to have a good understanding of the historical aspects of what has occurred in the past, how everything is put together so that your model accurately represents the conditions to the best of your ability so that you get an output that is reasonable, and you need to be able to check that output with information that's available on infiltration rates, for instance. And the infiltration rates that I calculated, I believe, are available within the range of infiltration rate

data.

Q. I believe you testified, and I wrote it down and hopefully I got it right, closed-loop systems are not applicable everywhere; is that correct?

A. I believe I said that. That's correct.

Q. That sounds about right to me, too. Why don't I turn your attention to one of the exhibits that has been admitted now. It would be Exhibit 2, the Energy New Mexico publication in the Independent Petroleum Association and direct your attention to Page 17.

MR. JANTZ: Madam Chair, point of clarification. I don't recall Exhibits 1 or 2 from the Independent Producers being moved into the record.

MS. FOSTER: That's correct, I didn't move that into the record, I moved Exhibits 5 through 14 and 16 into the record.

MR. DANGLER: Is it possible for me to ask a question about something not in the record yet?

CHAIRPERSON BAILEY: I don't believe so because he has not testified to that exhibit.

MR. DANGLER: I think he did testify to working on that specifically. That's why I wanted

to ask him about it. But I don't actually -- just sticking with the quote that you had.

Q. I want to make sure I heard the testimony correctly when I was listening earlier in the Pit Rule hearings. We had a witness who does work with ConocoPhillips in the San Juan Basin.

A. I'm confused as to what witness. If you could tell me which witness that was, that will help me.

Q. I am actually forgetting the gentleman's name. I need to look it up but I think he was one of the few witnesses that testified about economics.

A. As I recall, Bruce Gantner testified about that, who is sitting in this it room.

Q. I am guessing it was Bruce Gantner.

A. Obviously, I am not Bruce Gantner.

Q. No, of course not. What I thought I heard, and you have been listening as well and I want to make sure I am not way off the chart here, I thought he was talking about his company or one of his companies that he works for using Pit Rule -- using the closed-loop system in approximately 20 percent of their wells, either 19 or 20 percent. Do you remember that?

A. I recall him presenting some testimony

related to the percentages. You know, specifically I think it's listed on his slides and what that cost burden was for them to drill those wells with the closed-loop system.

Q. Okay. So I'm just having a little language problem here. That seems to be 80 percent of their wells they were still able to bury on-site.

A. You know, I can't speak for Bruce Gantner, but in Northwest New Mexico, because of the low chloride drilling fluids, we are able to bury on-site with the testing requirements and going through these things. One of the provisions that IPANM is asking for is where groundwater is greater than 100 feet that no testing would be necessary. But yes, we can drill and bury in place in Northwest New Mexico.

Q. So just in terms of that area and that testimony that we have heard, that's kind of what we know, that would be an example of closed-loop systems not being applicable everywhere. One out of five.

A. Right, but I believe that even his testimony was stating even there were many of those wells that they believe they should be able to drill, bury in place and not be required to have the

closed-loop system, and especially with this commodity price, those are rigs not running and people that are not working.

Q. I think you testified moving up a list of states that are producing. Aren't some of those states that are producing now because there has just been huge discoveries like the Bakken?

A. The Bakken technically has been around for a long time so I don't know if I agree with your statement.

Q. Isn't it true that there's been huge development in the Bakken in the last three or four years to the extent that the state can't even keep up?

A. I don't know if the state can keep up or not.

Q. This is really just a completely open-ended question because I really don't understand it and I really want to understand it. If I am asking you to repeat yourself and it draws an objection, that's fine. I am hoping I can understand it a little bit better. I am trying to understand this air drilling and cavitation and unbalanced concept that's knew to me. Do you mind running that by how that fits into everything else?

A. I will try to give you an example.

Q. This would help.

A. In a significant portion of the San Juan Basin we drill with multiple fluid systems. For instance, when we start and spud a well we have what's called spud mud which has -- there was some testimony about bentonite. It's a significant amount of bentonite clay in that and that's where we drill the surface section of the hole. That is mud drilled. We then encase the section and cement that section. We follow that by drilling, typically for a Mesaverde well, eight and three-quarter hole, I believe, and mud drilled into the top of the Lewis shale formation. We set a string of seven-inch casing, cement that in place, protect the groundwater.

At that point in time we normally, in a large portion of the basin, switch to an underbalanced drilling fluid: Air, natural gas, nitrogen. In the specific instance of the Mesaverde formation we do not use nitrogen very often. We then remove all the liquid from the well so there's no more mud in the well, no more water in the well. Then we drill the next section of the hole from the base of the Lewis shale formation through the

Mesaverde formation, which is one of the most productive units in the San Juan Basin. We drill that with an underbalanced drilling fluid being air or natural gas, so we have compressors on the surface. We compress that air or we take natural gas out of the pipeline, elevate the pressure, put it down the drill pipe. The drill bit actually rotates on the bottom of the hole and the rock actually removes itself. The bit clears a new rock face but then because the drilling medium is underbalanced, the rock particles, the cuttings then come out next to the bit and move up the annular area of the casing in the hole. Then they come up to the surface.

Obviously, you cannot put -- or it's extremely difficult to put the air or the drill -- the air and the drill cuttings and the debris and any potential natural gas flowing into the mixture and bring it up the annular area and it comes up to the surface through the blowout preventer stack, and typically it's sent through a relief line or a bluey line, it's called. It's typically seven inches in diameter. It has to run, I think, 180 feet from the wellhead for safety purposes.

Then that empties out into what

historically has been an earthen berm area. And then that segment or that section of the area of the pit -- that's the berm section of the pit -- obviously the air goes into the atmosphere. The drill cuttings come out the end of the line, hit the back of the dirt wall. In some instances we have what's called a -- it's not a flowback tank but like a catch tank system. It can catch some of that debris and/or liquid, but the design of the pit, the pit design and the construction area -- because sometimes we are flaring it. For safety purposes we light that on fire.

Q. Right.

A. Obviously, you cannot have a liner there because if it's burning the liner would not exist. But what does happen is the rock crystalizes on the surface. The sand and those sorts of things. And the fluids that come back, the liquids, come out into the earthen section of the pit and they drain. They drain over to the lined section of the pit.

What also happens is the majority of the liquid that comes out, especially when you are flaring, evaporates because you are just cooking it and burning it. That same process goes on in different functions during a workover process

because that's how we work. Because if you put mud and fluid down on a well you could damage the reservoir. You could damage the resource. So you want to be able to have a regulation that the unintended consequence is not that you have suddenly banned air and underbalanced drilling operations because you forgot to include it in the rule, because I don't think that's the intention of anybody here.

Q. So would you suggest a separate rule for that kind of situation that isn't -- maybe it's stricter than the Pit Rule or similar to the Pit Rule because it's really a different situation?

A. I think we have more than enough rules personally. I think that with regard to pits and activities, that the language that we have proposed to be inserted, which is minor, would be appropriate and handles the existing conditions, and I would just recommend that it's not left out of the commissioner's decision.

Q. One other little area, and it's kind of an area where I'm going to express agreement and then a little disagreement. So I don't want you to confuse you because I know when I agree it's kind of confusing.

You talked about how, first of all, we use terms kind of too generally and I would argue actually we use the Pit Rule too generally but within that the closed-loop system, I think you were talking about. For the purposes of the point you were making, I think you were at least defining it down to two separate things, one being the machinery on the surface -- am I being fair?

A. I believe that what I was concerned about was that many people believe that closed-loop drilling is this nirvana, this panacea that everything is wonderful; that from an engineering perspective what we are dealing with is solids control equipment. The sanders, desilters, centrifuges, tanks, tubs, all the various equipment is really a solids control item.

Then the purpose in my mind of the rule and what we're doing is what do you do with the solids, which is different than some of the questions that you have asked me relating to the liquids. I think that's the focus of what the Pit Rule should be about, in that it's how you handle the cuttings, whether they are hauled off because of the risk criteria or is it acceptable for them to be buried in place at the well site.

Q. That makes sense. But you went a little further and I was interested in where you went because of just regulatory issues. I thought I heard you say that really the industry should be free to do whatever they are going to do in terms of processing, and what I'm thinking of is there's a lot of technological innovation going on with the processing right now, but I heard you say that was not the greatest place for the Pit Rule to be applied for each of those machines. Was I wrong? You were concerned with the final thing buried or not buried, that that was appropriate, but that it wasn't so appropriate to regulate which kind of truck you used, which kind of tank you used. Was I correct in hearing that?

A. I believe that the focus of the regulator and their attention should be to the disposition of the drill cuttings. It should not be flow process through that and defining what each criteria piece is because it's different. It's so different every single time, and it should be -- you don't want to set a standard that one operator may Cadillac it and another operator may not and they achieve the same goals with the same protections to public health and the environment.

Q. And that actually encourages innovation? Is that fair to say?

A. I think as an independent company, I think the independents are the innovators many times in the oil and gas industry, whether you look at the shale gas development or the shale oil development, so it's important to make sure those capabilities are available for smaller producers.

Q. So I agree with you up to there, and then you said something about how you didn't like -- I'm sorry that I don't remember the exact language, but there was an appropriate something that you were afraid was going to be misinterpreted by a regulator.

A. Yes. And it dealt with that language about appropriate engineering standards because who is going to determine what an appropriate engineering standard is? And is it even necessary to determine it or is it better to leave that engineering decision, equipment decision to the operator who is drilling the well?

Q. But would you not agree that there's a difference between a standard, like an appropriate engineering standard that definitely leaves a little vagueness, I accept that, and the regulation of each

and every truck in the process that you're rendering the final tailings. Do you see what I'm getting at?

A. I'm not sure if I do, but maybe you can rephrase it.

Q. Okay. It's a hard concept. I'm sorry. For me, too. I'm not making fun of anybody else, just myself. If we are measuring the tailings -- now, this is not assuming part of your argument because I am assuming we measure the tailings and find out what's in them.

A. Can I ask a question? You are saying the tailings as in the --

Q. Whatever is left from the cuttings after we process with the trucks and all. If we measure that, we have a definite standard, correct?

A. Where are we measuring that? At what point?

Q. Not necessarily that you are conceding this is a good idea, but say we measured after you finish processing it to make the decision whether to bury it or not. Say you do certain measurements of that product.

A. Right. That kind of drives my concern. Who is going to determine -- am I testing every single truck load, you know? And different things

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like that. That's where I'm --

Q. Pretend we could leave that to a subcommittee and we say we did some testing that would give you a standard for which all the other activity that happened with the rendering of that, whatever the company decided to do to get their particular tailings at this particular site so hopefully they could bury them on-site. We won't regulate all that. That still sets a standard, correct?

A. I guess I'm confused, because I guess the simplistic question that I have is are we removing the cuttings from the well site or are we burying the well cuttings in place at the site?

Q. I guess I'm saying that would depend on the level of things in the tailings. If the levels are low enough then we are burying them on the site. If they are too high we are probably having to take them off-site.

A. I believe what we tried to put forward in the rule in IPANM's recommendation is risk-based, based upon siting criteria and depth to groundwater. In our instance no testing would be necessary for burial in place.

Q. Correct. So that would be your position,

but all I'm saying is in this hypothetical world if you did that testing you would have a standard. Is that fair to say?

A. I believe that's what we tried to set in Table 1 and 2 were standards for the instances where the testing would still occur.

Q. So let's take those. Those are the standards. Similarly to that, the idea of an appropriate engineering standard is a standard. You don't like the language but it's a standard, correct?

MS. FOSTER: I'm going to object to the question. I'm not quite sure what he is asking for here. He is using the word "standard" interchangeably and I think he means two different things on the word "standard." Mr. Mullins testified that the table has certain levels that are established that industry is recommending, and now Mr. Dangler is moving into engineering standards, which is a completely different meaning of the word. I would ask him to clarify the question.

CHAIRPERSON BAILEY: Would you please? Because I am also confused as to where you are going and why.

MR. DANGLER: It's really tough. I'm

sorry. If you remove that language as you wish to remove that language, then there is absolutely no way to judge what you are doing other than what you judge it as.

MS. FOSTER: I'm again going to object to the question. I think he is talking about -- if he could point us to the part of the rule where we are saying that we are removing the engineering standards and limiting it to that part of the rule, that will be fine. But his question is extremely open-ended.

MR. DANGLER: Let me try in another place. Maybe it will be clear in another place.

MR. SMITH: May I ask a question here? Going back to where you began, is what you are attempting to do, to draw a distinction between setting a standard and micro-managing operations?

MR. DANGLER: Yes, I am. I am attempting to draw that distinction that it's great to leave micro-managing and a lot of those decisions to the industry because they then can innovate, but that without any standard my question is, is there a failure of regulation. The second example I wanted to use maybe clearer and it was asked by someone else about the difference -- I think counsel for the

OCD -- about the difference of reasonable or the standard of equal or better.

Q. Equal or better has a particular meaning to most of us and reasonable had no particular meaning and we were asking you about reasonable, and --

MS. FOSTER: Again, I object because I believe counsel is asking in the context of reasonable had to do with the language of reasonable protection of freshwater as designated by the State Engineer. That is the part of the rule that she was pointing to as opposed to the part of the rule that Mr. Dangler is talking about here, which is Section 19.15.17.9A that talks about IPANM's recommendation of the deletion of appropriate engineering principles and practices. He is mixing apples and oranges in the question.

CHAIRPERSON BAILEY: Can you rephrase so we are not mixing apples and oranges?

Q (By Mr. Dangler) I guess what I was thinking when I was listening to you talk about those things was that you had a fear that enforcement would be peculiar and you were asked if you had any examples of enforcement being peculiar, and the reason I asked you about regulatory

background is I was wondering if you were familiar with the concept of substantial compliance.

A. I'm somewhat confused. You used the word peculiar and then substantial --

Q. Well, I think you gave an original example of water from a special downpour getting on the ground and someone declaring, based on that very unusual rainfall, that this was suddenly a wetland or some other kind of overly zealous regulatory action.

A. Let me tell you -- and this isn't polite -- what I can envision happening. You're very proud. You're a small operator, very proud of the job that you've got. You come out and for one reason or another, unbeknownst to you, your regulator has an axe to grind for some reason. I'm not saying that's occurred or anything like that. You just got done showing what a great job you are doing and then that regulator stops and decides to take a leak -- to go to the bathroom, take a leak right there.

Q. Discolored sand?

A. And gets down and says, "You know, you have done all that great work but I have my camera here. I am looking at discolored soil you have

there. I expect you need to do that stuff." I'm not saying that's occurred in the past, but when you get into some of these discussions about what's going on and we want to have some regulatory certainty, what do we do as an operator of that hypothetical? Again, that's totally hypothetical.

I believe that what we put forward in the language modifications that we have recommended that they are protective of human health and the environment, make a rule that can be enforced and operated under by the industry. You know, when you say peculiar, I just don't get that word in this context.

Q. It's a wonderful word that lawyers use because it doesn't mean very much. Do you think you can legislate in a Pit Rule hearing, whatever hearing we are in, do you think you can legislate in such a way that you're going to stop that rogue person from peeing on the ground? It sounds like a stupid or facetious question but it's a serious question.

A. I think that the purpose of the regulation of what we are trying to do, both from a regulatory body standpoint and the industry and all of the parties, is to get a functional rule that meets the

statutory requirements of the Oil Conservation Division, and I don't know if we are ever going to be able to cover every single incident, but I think we should take practical, common sense steps to approach the various situations that occur.

Q. I'm in complete agreement. My problem was taking away a standard that I can understand and replacing it with one I can't understand and saying that that's more regulatory certainty. Because I don't understand reasonable and I do understand equal or better. Equal or better gives you the chance to innovate but leaves the level of protection the same. Reasonable means we are in a different universe, and as a regulator I wouldn't know where I was. That's where I was trying to draw a distinction, between the places we are overregulating, which I really understood when you were talking about the trucks and things on the surface, and areas where we have a standard and it appears that you might want to just take that standard away because of imagining a parade of horribles that might happen.

A. I believe where we recommended the change in language of reasonable, number one, is in the variance section, and that's an appropriate word to

be placed in there in the variance section, which gives the site-specific ability of the local OCD office to work out what's reasonable.

MR. DANGLER: I have no further questions, Madam Chair. Thank you for everyone's indulgence.

CHAIRPERSON BAILEY: Dr. Neeper, did Dr. Bartlett have to leave?

MR. NEEPER: Yes, he will be back tomorrow morning.

CHAIRPERSON BAILEY: Would you like to cross-examine the witness?

MR. NEEPER: Yes, I would. I have some questions for the witness.

CHAIRPERSON BAILEY: Would you mind coming up?

MR. NEEPER: I had intended. Since my questions are lengthy, I bring up the point, would this be time for a break if we are going to have one in the afternoon or would you prefer to go ahead?

CHAIRPERSON BAILEY: It's been an hour since the last break. Why don't we take ten and then we can go all the way to 5:00.

(Note: The hearing stood in recess at 3:31 to 3:41.)

CHAIRPERSON BAILEY: We will go back on

the record.

CROSS-EXAMINATION

BY MR. NEEPER

Q. Good afternoon, Mr. Mullins.

A. Good afternoon, Dr. Neeper.

Q. I recognize that you are actually doing the job of three people here. You are serving as an author of the rule and talking about words in the rule; you are serving as a modeler and explaining your detailed models; and at the same time you are having to deal with questions almost on the philosophy, how do we do things, what makes a good rule. So I appreciate you wearing three hats.

I will take the first set of questions pretty much taken in the order from which I heard things in your oral testimony. That will occasionally overlap dealing with the rule or dealing with details in the model but I'll try to keep the boundaries separate where I can.

Early in your testimony you mentioned that the APD carries a location that specifies pits and then you said -- I heard words of wanting to remove that. I had the question why remove the specification where you are going to have a pit, especially if you are going to bury waste in the

pit?

A. I'm not sure if you might have misheard me or if --

Q. I probably did.

A. What I was stating is the prior rule, Rule 50, already basically had the location of the temporary reserve pit identified and still does. On every single application to drill, the location of the temporary reserve pit within probably a foot or two, for all practical purposes, specifically identified with GPS coordinates, latitude and longitude, is already being filed, was filed under Rule 50, was filed previously prior to Rule 50.

So there were many statements, whether in the media or representations, that there were these unknown locations of these temporary reserve pits. I was not aware, specifically since I have been working and researching the records, I'm sure there's probably a few out there that are difficult to determine where they are, but they are probably 50, 60 plus years old.

Q. So you were not advocating that the specification be taken off the APD?

A. No.

Q. Okay. That answers that question.

A. But to come back to that, it drives to the point of why do you fill out the C 144 document to begin with? Why do you put the information in, filing of the deed of notice, the recommendations, when all this information is already available? It's already been prepared. It's already on file. It's just duplication of paperwork, in my opinion.

Q. Would that be simplified by a simple marker on the pit location as you have on -- I can't think of the word now. I want to say a field well, a plugged and abandoned well?

A. We have issues, unfortunately, relating to placing above-ground dry hole markers or above-ground temporary reserve pit markers. Number one, they are a hazard driving, especially when you are working on an active well location, to drive into it. Again, it serves what purpose when we have a wellbore, a well that's drilled 10,000 feet in the ground with a steel marker 10,000 feet down and above ground with a wellhead on it. Then we have a drawing, a plat with footages to scale where the pit location is. We are already filing those documents. And so the necessity of doing some of these things, which we are currently doing under Rule 17, escapes me sometimes is just my point.

And what I was trying to say, it's already been given, so the necessity -- one of the prior Pit Rules, well, we need to know where the pits are going to be, we already know where we are at in that instance.

Q. In the future would people know where a multi-fluid pit would be?

A. Yes, because it's filed in the paperwork.

Q. It's in the paperwork but not in the location.

A. Right. Maybe at that point in time we will all have phones that will allow us to bring up the records right there.

Q. You have mentioned that it was very important to understand the inputs in the modeling process. I would raise the question: Is it not even more important to understand the algorithms internal to the model?

A. Yes, I believe, it's very important to understand what is occurring conceptually as well as obviously mathematically. I am not a writer of the code and the algorithms that are used in the models. I'm a user of these models and I hope to be able to answer many of your questions. I know you write code, so I will do my best to answer your questions

if they go into that category.

Q. That's past history. When it got tough I would get somebody else to do the actual writing.

A. And I was a physics major initially when I went to college, as an aside.

Q. That's a good start. That's where I started. Everything that happens in your model starts with the top. There's rainfall, there is snow, there is something, and you talk about the transport through the water moving down. A big part of whatever happens to the water input happens within that top layer. I think you call it the evaporative layer because water goes in and comes out in various ways. Is this handled by a recipe or is it actually handled by modeling point by point the movement of little drops of water?

A. I believe it's handled in the term that you would use, a recipe, but that's why I tried to include the modeling documents so we could address each category as so needed.

Q. I think it's important to recognize then that this is a recipe-driven code, not a simulation. We understand the difference?

A. Yes.

Q. It brings up the question then of accuracy

in that what happens at the top of your modeling eventually results in some small amount of water coming out the bottom. You put, roughly speaking, 14 inches of water a year in the top and, roughly speaking, a millimeter a year out in the bottom. That's accuracy of about 0.2 or 0.3 percent. Can you address the accuracy of this code?

A. I'm not sure I understand your question.

Q. Okay. Fourteen inches of rain is about 355 millimeters, so your output of your code is about one in 355, very crudely?

A. That is correct.

Q. You miss it by a millimeter and you've lost something.

A. I'm not sure I understand your statement there if you miss it by a millimeter.

Q. All right. If you get the output wrong by one millimeter, you have either doubled the delivery to the ground or cut it to zero.

A. In the representation that you have put forth, that's correct. In the representation where you have 355 -- you converted the units --

Q. The results that you showed.

A. The 355 millimeters per year --

Q. Per year.

A. Going into the model. Now, of course, the model is working on a daily basis.

Q. Yes.

A. We extrapolate that out and get an average yearly infiltration rate.

Q. Right. Your results are on a yearly basis.

A. It's basically saying you are putting 14 inches of rain in the top evaporative zone, if we are going to segment that out, and then we have the recipe, as you indicated, and out of the recipe based on my modeling you are getting around a millimeter out instead of 355, correct. And that is in these locations in New Mexico.

Obviously, if you are in different climatological areas, different soil conditions, different things. Such as Louisiana, it could be your result would be significantly different. You may have 355 millimeters coming out the bottom. Or likely less, but you are going to have a different number.

Q. So do you have any feel or have you done any investigations or have you done any comparisons with tests that could tell you what is the accuracy in this regard? Because with your information, you

are needing a pretty accurate result.

A. Well, what I tried to do was compare the results of the HELP model, the resultant infiltration rate, with the published literature infiltration rates that were available to me. Predominantly, those came from Dr. Daniel B. Stephens' testimony in 2007. He had gone through and summarized the infiltration rates from Dr. Stone, from New Mexico Tech, all the other studies that have been done that represent infiltration rates in the state of New Mexico.

In addition to that, that's where I was looking for some other confirmation which I reference the Walvoord reference, which Dr. Daniel B. Stephens did. That's not actual infiltration rate data, but that's based upon their modeling of what those infiltration rates are, millimeters per year.

Given that, given the review of the salt bulge condition, the natural salt bulge condition, I believe the numbers, the infiltration rates, the HELP model output to be reasonable.

Q. Are you maintaining that those infiltration rates are characteristic of other places in New Mexico than just the specific

locations listed?

A. No. I tried to, rather than one pick one location per basin, which the Oil Conservation Division did, specifically my initial focus was in Southeast New Mexico, so I tried to take a distribution of available locations that had data to work from, and so that's what I tried to do.

Q. But the rule applies to the entire state of New Mexico; is that right?

A. Yes, the rule applies to the state but the oil and gas development in the state is concentrated in those particular areas. In the Southeast New Mexico portion, I tried to take Maljamar, for instance. I think the only other person might have been President Obama to visit Maljamar and many of the rest of us, so I thought it would be interesting to include that data.

Q. I have been close but never been there. But isn't that very different from someplace like Mora or somewhere in Rio Arriba County where drilling has come? We are trying to apply these, a general result of the things you have shown, to the entire state.

A. I believe that the rule, the way it's written to handle the low chloride drilling fluid

systems and the remaining fluid systems, is appropriate. Obviously, we could go to Mora and we could run some modeling to represent what we believe the conditions would be in Mora. That's not what I did here, but we could obviously do that, but I don't think that's necessarily think that's necessary for the modifications that we are making to the existing Rule 17.

Q. Clarification on the model. You have said that the model is two dimensional. It calculates in terms of Multimed --

A. Correct.

Q. You think of the whole package as the model?

A. Correct. The Multimed is two-dimensional.

Q. Is it not one-dimensional vertically until you reach groundwater and then one-dimensional horizontally?

A. Yes. In the instance I ran it, yes. But if we include the dispersivities or the elongation effects and things, you could lessen the contaminant by running the Multimed model. I could dilute the contaminant. I could dilute the contaminant with the Multimed model and I'm telling you that I did not dilute the contaminant nor did the Oil

Conservation Division.

Q. You used 48 inch of evaporative zone.

A. Yes.

Q. Does the liquid actually evaporate there or is the recipe representing the unsaturated flow of liquid up to ground surface where it evaporates? What's going on there?

A. My understanding of the evaporative zone in the HELP model and how it's utilized is that is the limitation depth where evapotranspiration and evaporation effects would move water up out of the system.

Q. By a formula that somebody invented somewhere?

A. Some code that's in the book right next to me here, yes.

Q. Right. Can you tell us when that code was developed?

A. I would have to look at the reference. I know the dates and the reference material is listed in there, but I did not go back and line up the prior base papers that were sourced in the preparation of this.

Q. The manuals were written about 1990, one of them published in 1994; is that correct?

A. I believe that's correct, yes.

Q. And do you have a sense you can share with us of what were the limitations that were based on the development of that code? What was confining the developers or what were they trying to do and what were they -- they've admitted this somewhere.

A. Yeah, that's a very good question. The purpose of the, I guess, the two-tier model, the HELP model and the Multimed model, was specifically to be utilized to give regulators an idea and designers an idea of the adequate protection of groundwater resources and a better understanding of the concentration specifically that a design, for a landfill design in particular, that would be protective.

Their generalized statement, and I'm generalizing, was that an appropriate design, an appropriate design for a facility would allow for a reduction of the contaminant, the leachate, coming out of the bottom of the lined area, of at least, I believe it's 100 to one, 100 to one design ratio. So when you look at the inputs and the outputs of what goes into the Multimed model in particular, when we start with 100,000 milligrams per liter of leachate and our highest value at 100-foot lateral

distance, 100-foot vertical distance from the location specified was 68 milligrams per liter. That is a design criteria well above what the EPA, as I understand, would consider to be an acceptable design, acceptable protection.

So the models utilized together were put there to give some level of comfort that the appropriate conditions were being analyzed. And in our particular case in both the 25 foot to groundwater and the 100 to groundwater situation, regular 100,000 milligrams per liter situation and the 1,000 milligrams per liter appears to be protective.

Q. The results are protective as long as the model is sufficiently accurate?

A. Right.

Q. I'll give you an answer and say with the implication, is this right, is this reasonable to you? Was that model, the numerical model, not your particular input, and the recipes that went into it, designed because the designers were very limited in the kind of computer power they had at the time and, in fact, that was designed to run on an IBM PC at the time and that's why we have the recipe for the given code?

A. You know, I don't know what the designers -- I mean, they have some literature. In the material they explain why they did it. But I don't know. I do know that I have to run it on my old computer because it's DOS-based and I can't get it to run on the new Windows system. So it's that vintage of use. This model is being used today in many states, Wyoming specifically, for quite a bit of work.

Q. Your arrival of chloride at the receptor assumes, does it not, that there are no other pits anywhere?

A. Within 100 feet, that's correct. I only modeled this one instance.

Q. You modeled 100 feet, but if downstream, down gradient, hydrologically speaking, there is another pit, then you would double the input; is that right, of the stream?

A. I don't know if that's correct. I know with that receptor location it would probably be appropriate, assuming that the receptor is, let's say, a drinking water well that is removing fluid, that the receptor would likely receive a contribution from both contaminant sources. But given that we now added another dimension most

likely to the way the aquifer is, if we have one pit here and then another pit here but then the receptor is here, then one of those two has got to be closer than 100 feet to the receptor. So if I have one pit at 100 fit, the other must be 200 feet or 300 feet away. I mean, there's a cumulative impact, I guess is what I'm saying, but I didn't model that.

Q. No. But did you consider it in terms of the impact results in the rule? If you have got four pits per square mile, what's the effect on the groundwater?

A. I did not consider that case specifically, but my opinion is that there is likely not a large cumulative impact at that one receptor from those four instances. If they were all equal distance -- I'm hypothetically trying to think through your supposition. If we have four identical pits, all 100 feet away identically, I would suspect that the contaminant that would arrive at the receptor would be four times the contaminant. So it would be six times 68 milligrams per liter at that receptor.

Q. And so can you understand the concern of those who fear many pits across a whole landscaping? We now have what, 90,000 presumably in New Mexico? And the cumulative impact versus an isolated case of

one pit and showing that one pit will have only minimal effect on somebody that lives 100 feet downstream?

A. I understand your question. I don't know if, from a risk assessment basis, that it would be much concern.

Q. Whether it would add or not?

A. I personally believe that it wouldn't be of any additional concern.

Q. You concluded that no top liner is needed. You repeatedly stated that. And yet your model can transport contaminants downward only.

A. That's correct.

Q. So your conclusion is not based on any of your modeling; is that right?

A. I don't believe that's exactly correct. I believe that it's in conjunction with some of the input material. If the pits that we were burying in place -- if we were in Louisiana, for instance, my recommendation would probably be different on whether to put a liner on top of it. But in the climate and the regions here in New Mexico, I don't see any reason to place the liner on top of the pit.

Q. That's a personal recommendation though. It was on the slide that showed conclusions from

your modeling. It is not a conclusion from your modeling; is that right?

A. In the way you phrased that, from my modeling I probably need to rephrase my conclusion. A liner is not necessary on top of the pit in New Mexico to ensure protection of freshwater resources, groundwater, human health and the environment.

Q. I now understand better. Thank you. I think I can clarify the question. Through the last ten years of discussions here we have often looked on that word, protection of the environment, as meaning only groundwater. And I have often brought in, "Wait, there's a place where people and animals and plants live, and that's the surface."

So my question that I was driving at was you have concluded a top liner is not needed, and I failed to point out that I was meaning to protect the ground surface. You have not considered that in any of your estimates; is that correct?

A. I think that's taking that into that top five-foot zone, and I would defer to Dr. Buchanan's expertise in that interval.

Q. But all of your statements about things being safe, whatever that may mean, 100 feet, are based on transmission by groundwater at the

specified depth?

A. Correct.

Q. It's not considering any other possible environmental insult?

A. I don't know if that statement is correct. I want to clarify here. The primary movement, as you said, in my analysis is down and then over, where some of the prior discussion has been about salt migration potentially up and whether that comes to the surface or not. I didn't model that portion.

Q. Right. I'm just clarifying that's not part of your conclusions.

A. Right.

Q. I got into that through the top liner question, but you were thinking of top liner as protective down. You had mentioned and firmly stated that you want a rule that's not subject to multiple interpretations. The example you gave immediately from that was that if you had a tear above the water line and the underlying soil was clean, you didn't want somebody coming in and making you excavate it. I believe I have your example correct. Do you remember giving that example? You might not.

A. Yes. Let me, I guess, go to that

occurrence and give a hypothetical.

Q. Okay.

A. You have a temporary reserve pit that was used to drill a well. It took seven days to drill the well. Operationally it was used during those seven days. You waited five additional days and then you started to dewater the pit so we have the bentonite solids settle out. The next week later you bring in some trucks and they haul off the hydraulic head. They haul off the water and the fluids. So we are leaving the remaining drill cuttings in place.

At that point hypothetically the last water truck to leave drops his metal hose that he was using to drain the pit and tears the liner above the mud line area in a fully drained pit. And that happens to be the day that the Oil Conservation Division inspector arrives on the location to look at things and they see that tear and they tell me, "Tom, you have a tear in your liner above the mud line. You didn't tell me about it. You didn't notice me about it. I would like for you to excavate the entire pit and test underneath the liner and prove it has not leaked."

That's where my concern is with regard to

regulatory risk, because I could see that possibility occurring. And I think when I talk about a common sense application in the rule, we need to take a look at that and understand that we are going to cut the liner off above that mud line portion, probably below where the tear is that we had and remove that upper portion of the liner and leave the other part in place.

And my concern that I have is we have a regulation that has the potential enforcement which becomes an abuse that doesn't offer any additional protection to human health and the environment; that you need to have some practical understanding of looking at where the tear is and seeing that it's above the mud line, above where the line of the material is. So that's my hypothetical concern.

Q. Where I was coming from was saying where does it say in Rule 17 if you haven't had a release that you have to excavate?

A. My understanding is that the existing Rule 17 could be interpreted to indicate that you may have had a release, and the only way to check that might be for you to excavate all of it and take a five-spot soil sample underneath where the liner was. And I can tell you that that specific fear is

why the majority of the parties, especially in Southeast New Mexico, are utilizing closed-loop systems.

Q. Thank you for explaining that. I thought of something as you repeatedly said you need a rule that's simple enough, need a rule that's direct enough, need a rule that is directly interpretable, all of these features. And I scribbled down for one moment an ideal rule, so I just want to try it on you really hopefully for the benefit of the commission, who has the authority to change words and simplify and improve things as they see fit. This is not a trick question at all.

MS. FOSTER: I'm going to object to this. Dr. Neeper and the Citizens for Clean Air and Water are not proponents to the rule. This sounds to me like this is a proposed amendment coming from Citizens for Clean Air and Water through this question.

CHAIRPERSON BAILEY: Objection overruled.

Q. The question was: Would you accept or like or be in favor of --

A. First of all, is this a hypothetical?

Q. This is a hypothetical case. It's putting us both on the same side of the table is what it's

doing. A few-line rule, a rule that occupies only a page or two that says you, as an operator, can do what you want as long as you leave no contamination. Is that the goal we are trying to get to?

A. I guess to answer that hypothetical, I think that's one specific concern that the IPANM has in particular; that if you are not leaving the cuttings and/or have a work -- I explained a workover situation where I am moving from well to well to well but I still have to file even your hypothetical one-page form. I don't even think the one-page form in the case of the workover that I'm talking about is appropriate.

Now, the notification that you are not going to be leaving any drill cuttings in place, especially in the instance that IPANM is recommending where groundwater is greater than 100 feet, no testing, no closure form, reduced regulatory burden all makes a lot of sense.

Q. I confused you with that, because when I said one page, I meant the whole rule be one page, not what you have to fill out. Let's go ahead. You have said that there shouldn't or that the proposed IPANM proposal is there shouldn't be testing if groundwater is greater than 100 feet. Does this not

ignore ground surface? Or is this applied strictly as testing of something that is buried and in part contained?

A. I guess that portion is focused on testing of the drill cuttings and the buried portion. There's reclamation standards that are recommended in the new rule that would apply in all instances on the reclamation part of the surface and the vegetation and that would apply regardless of whether testing was done of the drill cuttings that are buried.

Q. And you had suggested that there not be reporting of wet soils. But if there is a wet area, if you did regard it as a spill and probably a small spill, how do you treat this release? I'm not understanding the statement of no reporting of wet soil.

A. It's the reporting requirements into the Oil Conservation Division. It's not to state that the operator is not taking a sample. I think that's what we are saying is we are sampling it. We are not saying we are not going to sample that, but here is the question: You have that little spill and it's something that you can take a shovel and put in a bucket and get it and get the other inch below it,

and maybe even two more inches for good measure and it fits in a five-gallon bucket and you can put it in the back of your pickup and be done with it. The question becomes do I need to test the clean soil underneath that? Do I need to take a test of the soil in the bucket or do I have the common sense to say, "I spilled a little bit right there. I shoveled it up and put it in the bucket and properly remediated that." And do I need to file an abatement plan associated with that? What we are trying to do is have common sense to indicate that that probably doesn't warrant filing a report, it warrants fixing it and doing the proper operating practice.

Q. Right. But you have to have a five-barrel spill before the abatement plan requires you to report it.

A. I believe that's what the rule says, yes.

Q. So you didn't have to report the wet area.

A. That's correct, except for the way IPANM is interpreting the Oil Conservation Division's modification. We are concerned about that. If it is a five-barrel portion, I think everything is okay.

Q. You had suggested that the date to start

the clock on the pit should be the spud date. Since it is a matter of regulatory language would it not be more appropriate to be the date when fluid was put in the pit? That's when the pit started acting as a pit.

A. It could be. I believe those dates are going to be fairly close. Just from an ease of regulatory standard, it's pretty easy to know the date you spud the well because you file it on several forms, and it's convenient and easy to track. The date that the water truck put the first load of water in the pit is generally very close to the date they installed the liner in order to keep the liner in place so the wind doesn't get to it. But they could use some other date, but I think the appropriate date is the spud date.

Q. This came up in the testimony. You brought up the 25-foot model, and in that model you used the 1,000 milligrams per liter leachate and you said that's because of low chloride drilling fluid. Let us picture that there is some leftover mud in some form in the ground and a little bit of water is percolating through it as your model shows. Why is the amount that comes through after water has soaked through this dependent upon the initial

concentration? Doesn't it depend on almost how much chloride is in the ground, how much it can possibly leach out as it soaks through?

A. Your statement would be correct. The reason that the SPLP method of testing is making that assumption that you can move 20 pore volumes, for lack of a better term -- not pore volumes but you're going to remove all the weight. It's fully soluble, you are putting all of it into solution in 20 -- I'm having trouble with the word.

Q. I could fill in but that would be inappropriate.

A. What I am trying to do, but to come back to your question, what I represented in that exhibit was that the highest solid content measured from the sampling that I'm aware of was 5290 milligrams per kilogram and that the effective fluid coming out of that, assuming -- coming out would be 265 milligrams per kilogram on the leachate coming out of that solid. That's assuming it all comes out in 20 -- mass -- I'm missing my key word.

I raised that threshold to 1,000 milligrams per liter for the Northwest. If you look at the average criteria, the 5290, I think the average concentration was around 500 is what I

recall. So I have gone, taken the extreme and I have gone above and taken a leachate, 1,000 milligrams per liter leachate that I am modeling into the Multimed model as the representation for the 25 foot to groundwater, 100 foot lateral distance. So those are the figures that I utilized up in the northwest.

Q. This one is a very significant point, so I have to stay with it. We have a layer of chloride-containing material. Water is moving through it at the rate of about a millimeter per year. That's the rate it comes out of the bottom. You are saying that the most chloride that water comes out could contain is 1,000 milligrams per liter. That doesn't have much to do with the SPLP leach test.

A. For the thresholds that we are setting in the tables as being protective it does, from that representation. When you look at the modeling that I did and the OCD did and talk about that pulse and what that leachate is going to be, we are making that assumption of what that initial concentration of leachate is going to be. And the model assumes it stays the same.

Q. Yes.

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A. Is that the real world case?

Q. What I'm getting at is the assumption -- what you put into the top of Multimed is an assumption?

A. Correct.

Q. At 1,000 milligrams per liter?

A. Yes, from a concentration that is correct. That is an input, yes. Just as I used 100,000 milligrams per liter --

Q. Just as you used 100 times as much somewhere else?

A. Yes.

Q. So I am puzzled when we get to a case that really counts, only 25 feet to groundwater where you can assume -- why you can assume it leaches through the buried material can achieve only 1,000 milligrams per liter independent of the depth, the amount of buried material or anything else.

A. I don't mean to imply that that is what that amount is going to be. The 1,000 milligrams per liter is a set input that I selected. Using the analogy -- it's not an analogy. Using the mathematics that we are representing for solids to liquids, the highest reading in the northwest in the waste material is 5209 milligrams per kilogram.

Using that scenario under a leachate, what leachate I would expect to come out of that contaminant, I would expect 265 milligrams per liter to potentially be the leachate that comes out from that pit.

Does that mean that it is? No. Rather than use 265 I used 1,000 as a set point, 1,000 milligrams per liter as the leachate coming out in the northwest. The reason I didn't use a higher leachate in the northwest is because we utilize low chloride drilling fluids and the solids testing would indicate that I would not expect a high salt -- excuse me, a high chloride concentration in the leachate coming out. Doesn't mean it couldn't occur, but I would not anticipate that.

Q. We have a difference there. I simply can't understand that. In the definition you desired for groundwater, you wanted it defined, if I understood correctly, capable of entering a well?

A. And that's on Page 2 of our submittal. We are recommending a definition for groundwater, yes.

Q. In terms of having things that are clear and understandable and not arguable, you do not know whether it's capable of entering a well until you drill a well, case it, the casing, whatever you are going to do and wait and see; is that not correct?

A. I believe that based upon the information for an area, many times there are many water wells drilled throughout an area.

Q. Right.

A. You have a fairly good idea. I don't think you have to go drill a specific well at that location to identify that.

Q. If there is a well in the neighborhood and water is coming into it, you know. But we are faced with a case where the operator says there isn't any groundwater.

A. Let me --

Q. And I see that as an arguable point. If the definition of groundwater is capable of entering a well and there's no well nearby --

A. I think you can look at -- let's say, for instance, the location where you have existing oil and gas well logs, an SP log and some resistivity information. You probably get a very good idea if that's a groundwater interval. Now, what quality the groundwater is is an entirely different subject, but I think it would be fairly readily apparent to those working in that area and within the industry that that's where the he groundwater is, especially consulting with the Oil Conservation Division, which

is checking this material.

Q. I'll try one more time. Let's have a hypothetical case. I come out with my ground-penetrating radar and run it over the ground and I say, "There's groundwater down here at 20 feet." You say, "I'm going to drill anyway because that's not capable of entering the well." We have put in the rule a flat definition that is not very useful; it's arguable.

MS. FOSTER: Is there a question?

Q. The question is: Why is that then a good rule? Why does that simplify -- why does that take out this problem of interpretation?

A. I don't think there is quite the problem of the interpretation that you are indicating. I think using your hypothetical, your hypothetical also has an Oil Conservation Division regulator. So when you put those together, the Oil Conservation Division is reviewing this material in your application, and if it doesn't meet the standards they can deny your application. So that's what I would consider occurring. I think it is appropriate to define groundwater and to utilize the definition that's utilized elsewhere within regulations, so I think that was our attempt to do that.

Q. I recognize there's been much discussion already regarding confined versus unconfined in terms of definitions. Did I understand you correctly that you said it is hard to determine a confined versus unconfined?

A. That's correct.

Q. If it's hard to determine that, why does that make it a good rule?

A. I think I testified that it probably wasn't the best choice of wording. I believe that the industry was trying to define that depth to groundwater and not have it confused with the depth that the water may rise to within a well. So I listened to your prior testimony and I believe your concerns are legitimate.

Q. Do you have any other suggestion? Because I heard you say we could use something from a well, and I think that was a mistake because you are saying we want to be careful about using that in the well and having that confuse us.

A. I have had a lot of questions asked of me today. I recall one earlier, I believe, from Mr. Jantz that had some language that sounded acceptable, but off the top of my head I can't give you the answer.

Q. I appreciate the difficulty. I will ask the question about variances because they were discussed. As I understand, you find it a burden to notify the landowner and perhaps other people when you are seeking a variance. It adds difficulty to the paperwork. Am I understanding that correctly?

A. I believe that's a fair way of saying that. It could cause confusion and difficulty where I don't believe it's necessary.

Q. And you used the word that you were seeking certainty; is that correct?

A. Yes.

Q. Certainty in the regulation. Can you give us any reason why the surface owner or the public should not have equal certainty? Because they trust the rule. The only time they get to talk about it is when the rule is adopted so when you go for a variance you are changing the rule basically.

A. I believe that's why we have the Oil Conservation Division. That's why we have the Oil Conservation Division and the staff that review those items and decide whether they are going to approve the variance or not. My concern is that the notice to the surface owner suddenly becomes the approval of the surface owner. So I think the

division is capable of handling that in the best interest of protecting human health and the environment.

Q. And in your proposal, this would be handled at the field office level?

A. For a variance, that's correct.

Q. For a variance. Is there anything in the current rule that says if the landowner is notified he has some sort of authority to become an authority in the process? Some way to become an authority?

A. You will have to put the rule, the current rule, in front of me and we can go through that. What I have relayed is that the notification provisions tend to sometimes cause more difficulty than I think what their purpose was for.

Q. Very good. I understand your purpose for that. You had several times referred to the siting or setbacks of 100 feet and you referred to that as though it were justified by your modeling which involves transport in an arroyo -- excuse me, transport in an aquifer.

A. I believe the model gives a reasonable representation of the concentration that would be received at a receptor, 100 feet from a buried reserve pit.

Q. Does that give us any reason to use that same number or evaluation in setbacks from arroyos or other geographical physical things?

A. I believe that what was put in conjunction with that is the type of fluid, and that's one of the changes that we are recommending to the rule is the utilization and classification of a low chloride drilling fluid system. The 100-foot level was where that low chloride fluid system is utilized. In the other instances, because of whether it's a spill or a release or proximity, the siting requirements are larger and I think that's reasonable, and have some common sense also involved in that.

Q. There was some controversy over used springs versus unused springs. Has that term been changed in the IPANM suggestion?

MS. FOSTER: If Dr. Neeper could maybe point us to the language that he is addressing? Because I don't remember any springs language.

A. I don't recall testifying about that and I don't recall --

Q. You did not testify about that.

A. So I'm having -- you might have to assist me in reminding me in the rule, but that doesn't come to mind off the top of my head.

Q. I'm at a disadvantage because I don't have this version, I have only the earlier version so I can't deal with that because I can't site it. There is one question where I can recite the case. Revegetation is not required for pits, tanks and trenches. That would be 19.15.13F3C right at the very end?

A. F3C, which I show on the IPANM Exhibit 34.

CHAIRPERSON BAILEY: Page 39.

A. Would you repeat your question, Dr. Neeper?

Q. Yes. I would interpret the words in there as saying revegetation is not required for pits, tanks and trenches. There are words about contouring. I can read that into your testimony if that's a help.

A. I'm looking on Page 39, Reclamation, Revegetation, Part 3C, and I see, "Reclamation of all disturbed areas no longer in use shall be considered complete when all ground surface disturbing activities at the site have been completed and all disturbed areas have either been built on, compacted, covered, paved or otherwise stabilized in such a way as to minimize erosion to the extent practicable, or a uniform vegetative

cover has been established that reflects a life form ratio," which was Dr. Buchanan's information, "of plus or minus 50 percent of the pre-disturbance levels and a total percent plant cover of at least 70 percent of the pre-disturbance levels excluding noxious weeds."

Q. So the revegetation comes after the word "or." It is not required; is that correct?

A. I believe unless it is built on, compacted, covered or paved and being utilized in some other fashion.

Q. It would be sufficient to compact it?

A. That appears to be correct. If it's being utilized for additional operation, that's possible. It could have a covered compressor building over the top of it. I don't know.

Q. And in your modeling, I think was vegetation assumed?

A. Vegetation was assumed at a -- I believe it was the pore condition utilized by the Oil Conservation Division. I will have to refer back to the model but it was not assumed to be a growing crop land or anything to that effect.

Q. So the model then did not cover conditions that would be allowable under the rule state-wide?

A. I don't think that's correct. I believe it's applicable -- I could very easily remove all of the vegetation and have 100 percent bare ground. Obviously, that would increase the effective net infiltration rate that would come out of the model. I did not do that.

Q. You did not --

A. In this case but it could be done very easily.

Q. Then comes down to clarifications of just what the model has. As I believe we said, the top piece is the HELP model. It calculates some transmission and then Multimed takes that transmission or infiltration, lets the leachate travel down to the receptor, the thing at the bottom, which could be an aquifer.

A. Yes.

Q. Now, could we not replace fundamentally what Multimed does just by giving ourselves the assumption there is one millimeter, however much water you specify, coming in at the top? It will flow at a given velocity down through the soil and we need to know what that velocity is. If there is very high saturation it will go slow, but low saturation where there are not many channels for the

water, would it not run fast? So the one thing Multimed has to tell us in some fashion, has to solve for us is just the degree of saturation of the soil because it assumes the water is just flowing.

A. Well, Multimed said -- you said soil moisture as I recall, saturation level in there.

Q. Degree of saturation?

A. So it's not solving, as my understanding of your model did, you calculate what the saturation level would be coming up from the aquifer. So the Multimed model that I ran has a set assumption at what that saturation is.

Q. And so once you know the saturation, you can know the speed of motion of the water and you can write down the answer?

A. In general you could probably do it on the back of a napkin if you have the effective porosity handled correctly and assuming that all of the decay, real world co-efficients of degradation don't occur.

CHAIRPERSON BAILEY: Do you have many more questions?

MR. NEEPER: I do. I realize I am taking your time and if you find them burdensome and not making progress you are welcome to cut me off. I am

happy to stop at any time and that would give me an evening to condense.

CHAIRPERSON BAILEY: Let's stop and we will reconvene at 9:00 o'clock in the morning. We can take public comment at this point. Mr. Mullins, you will remain under oath until you are dismissed sometime tomorrow.

We have two people who would like to make public comment. The first one is Jose Varela Lopez. We have a time limit of five minutes. Would you like to make a sworn or unsworn?

MR. LOPEZ: Unsworn statement. I'm not a technical person.

CHAIRPERSON BAILEY: And then we will not cross-examine you either. Okay. If you would please come up where we can all hear you. State your name and where you reside.

THE WITNESS: Good afternoon, Madam Chair, members of the Oil Conservation Division. My name is Jose Varela Lopez and I reside in Santa Fe County at 86 Villa Los Romero in La Cienega, New Mexico. I am here today as a board member of the New Mexico Federal Lands Council. I served on the previous Pit Rule task force as an alternate in 2008, I believe, and given that the hearings came up again I just

wanted to make a few short comments on behalf of the Federal Lands Council.

I believe that the existing rule provides a sound process for ensuring the rights of the surface and subsurface owners to function in a manner that is respectful of the interests of both. Also I believe that it seems that the existing rule is not adversely affecting the oil and gas industry which seems to be thriving in spite of the overall economy.

As a rancher in New Mexico, I am keenly aware that our arid environment dictates that we collectively be as responsible as possible to ensure the long-term health and stability of the land and being a descendant of some of the original Europeans to settle New Mexico some 400 years ago, I know if our ranch lands had not been treated appropriately, they would not be as healthy and productive as they are today.

In conclusion, I believe while it may be desirable to make some practical changes to the rule to address oversights that were made previously and are part of the current rule, I don't believe that the rule should diminish the current safeguards that have served the state and its oil and gas and

ranching industries so well. Thank you.

CHAIRPERSON BAILEY: Thank you for your comments. Sanders Moore? Would you like to make a sworn or unsworn?

THE WITNESS: Unsworn statement.

CHAIRPERSON BAILEY: State your name.

THE WITNESS: Madam Chair, Commissioners, my name is Sanders Moore and I'm with Environment New Mexico. On behalf of our 15,000 members and supporters around the state we stand in support of the current Pit Rule. I understand it has been very effective at protecting our water quality, which we obviously are in an arid state so we don't have a ton of water, an abundance, so I think we should protect what we have.

I'm aware that prior to the Pit Rule we had many instances of contamination of groundwater sources but it has proven to be effective. The current Pit Rule has proven to be very effective. Because of those reasons I stand in solidarity with the current Pit Rule. Thank you.

CHAIRPERSON BAILEY: Thank you. We will see each other again at 9:00 o'clock in the morning.

(Note: The hearing was adjourned for the day at 4:55.)

REPORTER'S CERTIFICATE

I, JAN GIBSON, Certified Court Reporter for the State of New Mexico, do hereby certify that I reported the foregoing proceedings in stenographic shorthand and that the foregoing pages are a true and correct transcript of those proceedings and was reduced to printed form under my direct supervision.

I FURTHER CERTIFY that I am neither employed by nor related to any of the parties or attorneys in this case and that I have no interest in the final disposition of this case.

JAN GIBSON, CCR-RPR-CRR
New Mexico CCR No. 194
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