BEFORE THE WATER AND WASTE ADVISORY BOARD

STATE OF WYOMING

PROPOSED REVISIONS TO DRAFT WATER QUALITY RULES AND REGULATIONS FOR REVIEW BY THE WATER AND WASTE ADVISORY BOARD

TRANSCRIPT OF HEARING PROCEEDINGS

Transcript of Hearing Proceedings in the above-entitled matter before the Water and Waste Advisory Board, commencing on the 26th day of February 2010 at 10:00 a.m. at the Oil and Gas Conservation Commission Building Hearing Room, 2211 King Boulevard, Casper, Wyoming, Mr. Bill Welles presiding with board members Lorie Cahn and David Applegate in attendance. Also present was Mr. Kevin Frederick, Mr. John Wagner, Mr. Scott Quillinan, and Ms. Shannon Anderson.

P R O C E E D I N G S

(Hearing proceedings commenced 10:00 a.m., February 26, 2010.)

CHAIRMAN WELLES: Well, we'll go ahead and get started on the second portion of this meeting. This is the Water Quality Division. And the purpose of this meeting is to review Water Quality Division's response to public comments received by this board at its meeting September 25th concerning underground injection and storage or sequestration of carbon dioxide. And we are also -- the board is supposed to take action on this proposed regulation.

MR. WAGNER: Thank you, Mr. Chairman. My name is John Wagner. I'm the administrator of the Water Quality Division. And with me today is Kevin Frederick, who is the head of the groundwater section. And Kevin is the primary author of the rules. And I'll just turn it over to Kevin.

MR. FREDERICK: Thank you, Mr. Chairman, members of the board. This will be the third advisory board meeting for our review and your input and comments on the draft carbon sequestration regulation.

I believe you all have received copies that I sent you earlier this month of the draft regulation illustrating proposed revisions based upon your comments

at our last meeting, as well as public comments that we received. The handout that I provided also includes a copy of the public notice for this meeting, the statement of principal reasons, two copies of the revised draft regulation, one of which is annotated to illustrate essentially the source of the language in the proposed regulation, be it from EPA's proposed draft rule, be it from the statute that enabled DEQ to undertake this rule-making effort, or be it existing federal regulations related to the underground injection control program, which is fundamental to the rule.

Also included were copies of the public comments that we received from the Wyoming Outdoor Council and the Powder River Resource Council, our analysis or response to those comments, and lastly, a copy of House Bill 0017, which is currently being considered by this session's legislature, which is germane to primarily the financial assurance requirements for carbon sequestration projects, as well as providing the Department with authority to begin developing rules that establish those financial assurance requirements, as well as when in the process those requirements would essentially be released or fulfilled in terms of carbon sequestration, plume stabilization.

So, essentially, the definition of plume

stability would be included as part of that rule-making effort, provided that House Bill 17 is adopted and signed by the governor. It's my understanding that it's gone through the House committee hearing successfully. It's been essentially endorsed by the House and is in the process of going through Senate committees now for consideration. But I believe the bill is moving ahead fairly smoothly.

The bill itself is primarily based upon recommendations that came out of the carbon sequestration working group that was cochaired by Director Corra, the commissioner of the Oil and Gas Conservation Commission and the state geologist. And their report, I think, as I mentioned at our last meeting, was finalized in the fall and presented to the Joint Judiciary Committee and the Joint Minerals Committee for their consideration. And House Bill 17 was essentially drafted subsequent to the recommendations of that report.

So if I may, I would like to first review with you some of the comments that we received. And if you would turn to the comment section in the handout -- excuse me -- the subsequent analysis of comment section, again, the public comment that we received was from Powder River Basin Resource Council and the Wyoming Outdoor Council, copies of which are attached in the

document here.

MS. CAHN: Kevin, is it possible for you to put the microphone closer or something? I'm having a hard time hearing.

MR. WAGNER: Are the microphones working?

MS. CAHN: Could you just speak louder?

MR. FREDERICK: I'll try to.

MS. CAHN: Maybe we need to try to get them turned on.

(Discussion off the record.)

MR. FREDERICK: Many of the comments that we received primarily from the Outdoor Council related primarily to issues that relate to the financial assurance requirements for carbon sequestration projects. Those are particularly addressed in page 9 of the comments on long-term disability.

The need for post-closure monitoring, Comment Number 19 on page 9, also related to one of the major concerns I think that Outdoor Council expressed and seems to have been somewhat of a recurring comment as we've gone through the rule development process, not only by Outdoor Council, but by Powder River Basin Resource Council. And essentially, it's the concern that after injection ceases, that carbon sequestration projects, there's a period of time over which the carbon dioxide

plume essentially continues to expand in the subsurface until it becomes subject to the influences of hydrostatic pressures and so forth, which essentially lead to plume stabilization. And by that, I mean the plume essentially becomes an equilibrium and no longer continues to migrate within the formation. It doesn't any longer continue to increase in size and essentially is at equilibrium.

And the concern is that takes a period of time. It takes several years in order for that stabilization process to occur, and that there needs to be monitoring, periodic monitoring of that plume, to make sure that stabilization is, indeed, occurring as predicted, as required by the regulation. And it's certainly something that was recognized by the carbon sequestration working group and discussed with a recommendation that is incorporated into House Bill 17 that a special revenue account be established and funded that would provide for periodic long-term surveillance and monitoring to be completed for these projects by DEQ, by the Department of Environmental Quality. The funds would actually be used by DEQ to essentially continue to monitor, measure and assess the stabilization of the carbon dioxide plume.

Another of the comments dealt with long-term liability. Again, the issue here is who's responsible for the carbon dioxide post injection and during the

plume stabilization process. And again, in our analysis of the comments and response to the comments, I'd like to point out specifically in Comment Number 19 that House Bill 17 contains language to the effect that owner/operators of carbon sequestration projects would remain liable for a minimum of ten years following injection and would also require three consecutive years of data that indicate plume stabilization monitoring data.

The fund then would provide for resources for DEQ to continue to essentially assess and verify that plume stabilization following the closure, that point of closure, at which a certificate of closure would actually be issued to the operator.

We've tried to recognize the provisions of House Bill 17 in our draft regulation, as I've indicated to you before, on the requirements for long-term monitoring and financial assurance. And a lot of the concern, I think, that was expressed with respect to the liability and the monitoring aspects as seen in our comments here, we're hopeful will be resolved by the outcome of House Bill 17. We think that is going to be the mechanism to essentially establish the provisions for long-term monitoring and, again, the criteria for plume stabilization and the special revenue account for the long-term monitoring.

That said, we won't know the outcome of House Bill 17 for another week. And I believe it's our intent to assume the outcome is favorable, that provisions are made for DEQ to proceed with regulatory rule development on financial assurance requirements for carbon sequestration. And we can continue at least to move this regulation ahead as we've drafted it here, with the understanding that we will be back before the advisory board once the rules for financial assurance and plume stabilization long-term monitoring provisions are essentially ready to be presented to you as a separate regulation related to carbon sequestration.

So even though we speak to financial assurance requirements in our draft rule here, we essentially indicate or state that the requirements of Department rules and regulations must be fulfilled for financial assurance, contemplating that we will have other rules specific to the financial assurance requirements themselves.

A little bit of the background on some of the things that we're talking about as we move through the draft rule itself. That seemed to be one of the major issues that was expressed by Outdoor Council, in particular, as well as concerns with respect to their interpretation of carbon sequestration conditions that

develop with respect to fluid migration and fluid management, based upon their observation of a presentation given by the state geologist, Mr. Surdam, on the Rock Springs Uplift Project at the Geological Survey that's been involved with -- in concert with the University of Wyoming, as well as partners from industry, and the DEQ has also been involved in that effort, as well.

And the concern there was with respect to the migration of fluids during the sequestration project. In other words, as the carbon dioxide's injected, it's going to displace formational fluids. That's recognized in the regulation. And the regulation requires that that area of influence or area of review be established. And it includes that area in which brines or formation fluids are going to essentially be pushed out of the formation into other areas due to the injection of carbon dioxide.

I don't know if you are aware, but there was a letter to the editor in the Casper Star-Tribune last week that spoke of the issues with that situation as a limitation of carbon sequestration and pointed specifically to the Wyoming, Rock Springs Uplift Project. I believe it was a day or two later that the state geologist responded to that editorial and I think did a very important and interesting job in pointing out their

conclusions and their efforts to this notion of fluid migration associated with carbon sequestration and how that's managed.

I have a copy of that response I'd like to provide you and enter into the record. And at your pleasure, Mr. Chairman, I can either allow you some time to read through this if you'd wish, or I can point out what I think are a few of the salient comments that the state geologist --

CHAIRMAN WELLES: What is the pleasure of the board?

Just for your information, we have read the editorial comment by the professors from -- I believe it was Texas A and M. And we were going to ask you about that, anyway. So we definitely -- I don't know. What would the board prefer? Do you want to read this first and then listen?

MR. APPLEGATE: I've read it.

MS. CAHN: I wouldn't mind having five minutes to read it.

CHAIRMAN WELLES: Yeah. I'd like to read it.

(Pause in proceedings.)

CHAIRMAN WELLES: All right.

MR. FREDERICK: Thank you.

I think the response provided by the state geologist helps explain the concept with respect to fluid management when it's needed. I also think there are probably situations for sequestration projects where fluid management may not be that big of an issue or concern. It's going to be dependent primarily upon the size of the sequestration project in terms of volumes to be injected. It's going to depend a lot upon the characteristics of the formation with respect to its thickness, its permeability, its porosity and the degree to which it's actually saturated.

But I think, clearly, the notion of fluid management and the issues or concerns that were expressed in the comments that we received are fairly well addressed by the response that the state geologist provided on that issue, on that topic.

I think our regulation speaks to the notion that the area of review has to be sufficiently defined. We've included in our definition of a geologic sequestration project that that includes the plume itself, the carbon dioxide plume, the pressure front and displaced brine.

So, clearly, our regulation contemplates that that area of influence needs to be identified. And there are requirements in the regulations with respect to

looking at whether or not the geologic features as described in the regulation, in particular, confinement, indeed, exist where necessary. For sequestration projects, requires an inventory of all wells within and adjacent to that area of influence in order to evaluate whether or not there's actually any penetrations, bore holes, wells, and so forth, that actually penetrate the confining layer into the injection zone or not, and if they do, whether they need some sort of corrective action or rehabilitation in order to make sure that they won't serve as conduits of leakage to the surface.

In terms of brine management, in the event there is a need for extraction of brine, the Department has got permitting systems in place to deal with those and to essentially require that those are managed properly if they're going to discharge either to the surface or be reinjected into the subsurface elsewhere or into another formation.

So I think -- I think the systems are in place both in their draft regulation, as well as other Department regulations, to deal with brine management if that becomes a requirement of carbon sequestration projects. We anticipated that it may be a possibility in some situations, and certainly with respect to the Rock Springs Uplift Project, it is very likely it will. So I

think it's beneficial at this point to be involved in that project as it moves forward. And I think all of us are going to learn a lot as that project proceeds.

So with that said, I think I've tried to answer the questions and concerns with respect to brine management that were pointed out.

MS. CAHN: I have a question. It seems from the professors from Texas, Econ -- I don't know how to pronounce it. Economides -- that their major concern was that, in the modeling, that the assumption is, on a lot of these studies, that the pressure -- that the pressure would remain steady state and that, in actuality, would be modeled as a nonsteady condition. And I don't think you really addressed what Dr. Surdam's response to that is or what DEQ's response to that is.

MR. FREDERICK: Well, I'm not the modeling expert on carbon sequestration. I do know that it's a multi-phase modeling effort. And regardless of whether it's modeled as steady state or transient, I guess I'm not clear on which approach is recommended or taken for carbon sequestration plume modeling itself.

MS. CAHN: Does anybody in the audience understand the response from Dr. Surdam in terms -- I don't think the question is really being addressed in terms of what the issues were that were raised by

Dr. Economides. And the only thing -- I mean, I -- go ahead.

MR. APPLEGATE: I'll just ask maybe a vague question. Was the professor basically assuming that water wasn't going to be removed from the system, that brine was going to stay in the system, whereas --

MR. QUILLINAN: That's correct.

MR. APPLEGATE: -- Dr. Surdam has said, we're assuming that we're creating space because we're removing the brine from the system?

MR. QUILLINAN: Right.

MS. CAHN: So, essentially, there Dr. Surdam is saying --

MR. WAGNER: Let Scott introduce himself, and we'll go through that process here.

MR. QUILLINAN: Scott Quillinan. I'm with the Wyoming State Geological Survey. I've read both editorials, and I can speak briefly to them.

MS. CAHN: Great. Thank you.

MR. QUILLINAN: The professors from Texas A and M didn't take -- if you put pressure into the rock, you can't exceed the lithostatic pressure of that rock without frac'ing the rock. And so the Rock Springs Uplift Demonstration Project requires the removal of those brines to maintain a pressure so you can stay below

the frac pressure of the rock. And the report that the Texas A and M professors are referring to did not take into account removing fluids from the formation to manage pressures.

MS. CAHN: So the Texas A and M professors are saying it's a closed system --

MR. QUILLINAN: Correct.

MS. CAHN: -- and, in essence, it's really an open system?

MR. QUILLINAN: It's an open system with removing the brine.

MR. FREDERICK: Sorry. I didn't understand your question.

MR. APPLEGATE: So since we have a geologist here, I think you did note that there could be examples -- I'm not a geologist or a petroleum engineer. There are examples of systems where you might not have as much fluid in a system, so you could have capacity, perhaps, without brine?

MR. QUILLINAN: Sure. It depends on formation pressures and lithostatic pressures of the rock, depending on how much fluid you would have to remove, or in any case, if any needs to be removed. In the case of the Rock Springs Uplift, fluid has to be removed to stay under that pressure.

CHAIRMAN WELLES: So if I can back up a little bit, then, what you're saying is that the comment by Dr. Economides, whatever, however you pronounce his name, really was not germane to the Rock Springs Uplift?

MR. QUILLINAN: Correct.

CHAIRMAN WELLES: But how does that translate to an entire document which is supposed to control and protect the whole state? Because in my understanding of this, this won't be the only site. This is just the first site. And so, basically, every site's going to be different. So is that taken into consideration, that this -- that this rule and the subsequent bill for funding and everything is going to cover all of that?

MR. WAGNER: Mr. Chairman, I'm no geologist, either, but if I understand, the discussion is -- as you stated, every situation is going to be different. In some places, we're going to have to remove fluid to make it work, and some places they won't have to remove fluid to make it work.

The real question that I have when I see that is not so much the problem with whether you remove fluid or not, but it's what the heck happens to that fluid when you do remove it? And what Kevin pointed out earlier is we do have permitting processes in place to handle that.

For example, if, in the Rock Springs Uplift, they decide that they need to pump a bunch of brine to the surface and they want to discharge into the surface, well, they're going to have to meet the surface water quality limitations to be able to do that. In other words, they're going to have to build a big treatment plant up there to take the salt out of this water before they can release it into the Colorado River system, or if they decide they want to inject it into a different formation, then they'll have to get an underground injection control permit to do that.

So there will be a separate permitting system that already exists within the water quality division to handle that water if it's necessary to get rid of it to make CO2 sequestration work.

MR. APPLEGATE: So I think you guys maybe indicated that in the response to comments, that the sequestration site is not going to simply have a sequestration permit, likely. It's going to require a whole set of permits like other industrial projects, depending on how they're managing various waste treatments.

MR. WAGNER: That's exactly right. They may need an injection permit to get rid of the brine. They may need a surface water discharge permit to get rid

of the brine, along with the other 47 different permits they'll need from the BLM and so on and so forth.

CHAIRMAN WELLES: I hate to be a skeptic, John, but we spent over ten years trying to figure out an ag use policy. And that's not nearly as complicated as this, in my mind. I'm pretty simplistic when it comes to these things. I'm not a scientist. But I just don't see how you can cover all the bases. These two -- this article and the response from Dr. Surdam, I understand that. And I think he did a good job. But that's site-specific. And site-specific is something we've been wrestling with for ten years when it comes to coal bed methane discharge water.

MR. WAGNER: You're absolutely correct. In the case of the Rock Springs Uplift -- let me just speak to that one -- actually, any kind of surface discharge over there in that part of the country is real easy to deal with because it's in the Colorado River system. The agreement between the seven Colorado River Basin states requires that any surface discharge in that drainage has to be 500 milligrams per liter of total dissolved solids, a really tough standard. And so there would not be any question about the ag use protection policy coming into play in that particular situation.

If it was another part of the state, you're

correct. It could become problematic, or it could become a matter of dispute as to what the effluent limit that you might allow to be discharged to the surface would be. In the Big Horn Basin, we discharge up to 5,000 milligrams per liter TDS, and everybody's happy. In the Powder River Basin, ain't so. It's much more controversial.

So you're right, Mr. Chairman. You know, there's potential problems out there. But it's things we deal with all the time. And just because we've had problems with the CBM industry, and ongoing problems with the CBM industry, I don't think is a reason to hold up this particular rule just because it might become a problem in the future.

CHAIRMAN WELLES: Well, I appreciate your comment, and that's why I raised it, just to sort of air it out. Because I do see it as -- it's not really similarities, but there are similarities. And it's frustrating.

MS. CAHN: I think Bill brings up a good point that I'd like to discuss a little more, and that is, if the concern that the professors, two professors from Texas A and M -- can you hear me okay, John?

MR. WAGNER: Uh-huh.

MS. CAHN: -- that Texas A and M are

bringing up are not applicable for this uplift, Rock Springs Uplift, then -- but could be applicable at other areas of the state where you do have a closed system -- is that correct? I mean, there could be other areas where we could be doing this? Let's start with that question first.

MR. QUILLINAN: I believe there's detailed site geologic characterization as part of these proposed rules. Maybe Kevin can speak on that. I think that helps answer a lot of these questions.

MR. FREDERICK: I think -- in response to your question, Mr. Chairman, I think it's not unreasonable that there may be smaller-scale sequestration projects where brine migration isn't going to be nearly as much of an issue. We're certainly, I think, likely to see sequestration projects associated with perhaps smaller industrial activities that don't have emissions nearly on the scale of coal-fired power plants, for instance.

And the question with respect to the need for brine removal or formation fluid control or something like that is, again, it will be site-specific. It's going to depend upon a variety of factors. And I think there are going to be situations where it probably isn't going to be an issue or necessary or required at all.

But again, the regulation itself is for the purposes of carbon sequestration underground. And the system, I think, that is in place with respect to the characterization of the site, the definition of the area of review, the modeling that's required to essentially predict the effects of sequestration within the context not only of its subsurface reach, but also the analysis of overlying land use activities and so forth, is required as part of a permit.

And it seems to me that in projects such as the Rock Springs Uplift, given the magnitude and size, the analysis is going to show that, in the absence of brine removal, the sequestration project is simply going to be so geographically extensive that there's no certainty for management. In other words, the larger the area of influence or area of review, as we call it in the draft regulation, the deeper the analysis needs to be. And in order to control that and minimize the effects and therefore the potential risks, the brine removal has to be part of the equation. We recognize that.

MS. CAHN: I don't think you're answering my question, so let me try to ask it another way. And maybe the way to do this is to look at the particular sections in here where modeling is discussed. So what I'm asking is not about the Rock Springs Uplift. And I

think Bill is getting to the same question. We're asking about other projects in the state -- or I'll speak for myself. I'm asking for other projects in the state that would be a closed basin -- or closed system. So is the modeling that will be required by DEQ then going to be steady-state modeling or transient modeling, or is there something in here that, when we discuss modeling, where we might want to reword it to say that if it's a closed system, transient modeling needs to be considered or looked at or something?

That's where I'm getting at. If you're saying, okay, the comments -- the comments from the husband-and-wife team from Texas A and M are not applicable to Rock Springs, and Bill's asking what about the rest of the state? So what about other projects? Maybe to help me out, we could look at specifically where modeling -- I know I can't exactly find the right spots, but I know I read them here, that there were modeling requirements. So maybe we could go over those and make sure that the wording -- there's something in there about having to look at transient effects in closed basins or closed systems.

MR. APPLEGATE: Mr. Frederick, I would point you to the permit application section. This is Section 5, permit application.

MR. FREDERICK: Are you on page 24-22?

MR. APPLEGATE: I'm on page 24-16. I don't suggest this paragraph answers your question completely. But I would suggest that it goes towards that question. Paragraph D on page 24-16 talks about, as a necessary permit requirement, that the applicant submit data sufficient to demonstrate the effectiveness of the injection and confining zones. And again, not that it's conclusive, but I do think that that would be part of the answer, is if there's data in that paragraph that suggests that the applicant has to provide data that puts forth an argument that the system they've chosen can accept the CO2. There may be other sections in here, as well, that do that.

MS. CAHN: And I was actually specifically looking for those modeling sections. And, Kevin, you may be more familiar with where those are.

MR. FREDERICK: Yeah. If I could draw your attention, Mr. Chairman, to page 24-22. And it may be easier to work from the annotated version in the handout. I think I may have some pagination problems with the nonannotated version.

So if we look at page 24-22, line 7 -- or let's start with line 3. Owners or operators of Class 6 wells must perform the following actions to delineate the area

of review, identify all wells that require corrective action, and perform corrective action on those wells. And then it goes on to say, predict using computational modeling, the projected lateral and vertical migration of the carbon dioxide plume and formation fluids in the subsurface from the commencement of injection activities until the plume movement ceases.

I won't go on. But in response to the board's question with respect to, what I believe is, do we want to specify or begin to specify modeling approaches or requirements, I guess I'm a little -- I'm a little reluctant to go there. And the reason I say that is that I think carbon sequestration project modeling is something that is going to be continually evolving and improving over time. I don't know that the experts themselves have actually settled upon the appropriate approach or the acceptable model to use.

And EPA recognized that in developing its draft regulation, its proposed rule, and in its preamble, as I recall, spoke to the notion that there is a need for advancements in modeling of carbon sequestration projects. And I think they recognize, too, that specifying any particular type of model, certainly a public domain model, might actually inhibit the ability to use better models that are developed after this rule

is in place.

So I understand the interest and the concern expressed by the board, but I would hope that the analysis of models would be -- would be appropriate. In nearly all cases, these are going to be very expensive, sophisticated projects, I anticipate, regardless of the size. And I feel pretty comfortable that DEQ is going to have staff on board to be able to determine whether the appropriate model has been applied or not as part of the permitting requirement.

CHAIRMAN WELLES: Well, I guess my comment, Kevin -- and I certainly understand what your intent is -- I think I do -- and what your job is. I mean, the rest of the country is looking to Wyoming to figure this out because nobody else is doing it yet. And this may be the first pilot project, so to speak. We have, obviously, a great deal of investment in it from the standpoint of the income of the state from coal production, et cetera, et cetera. And so, obviously, we want to get it right. But because it's new -- and this is strictly, you know, from my layman perspective -- we've got a lot to figure out and a lot to learn, and we're probably going to make a few mistakes, but hopefully they won't be too huge.

And in some ways, it's similar, John, to the

coal bed methane water issues because nobody else had done that, either, on the scale that we were doing it or are doing it. But I feel that you've got to convince us that it's going to work and that this proposed rule is something that's correct and is adequate enough at this point in time in the whole scope of things to move forward. Because we're supposed to make a ruling on this so it will go forward.

MR. FREDERICK: Right. Mr. Chairman, I appreciate your comments. And I think my best response is that EPA is moving ahead with a draft regulation. Their draft regulation was developed with a lot of input. And we're relying heavily upon their draft regulation. Professional organizations have reviewed their regulation, for instance, the Groundwater Protection Council and the National Groundwater Association. And many of their recommendations for improving the rule have been incorporated into this draft. And I think it's been improved significantly because of that.

I understand the uncertainty with respect to carbon sequestration, and I understand that we're going to continue to learn as we do more. And I think it's reasonable to expect that there will be points in time at which we think modifications or revisions to this regulation are good ideas or need to be accommodated. I

don't know that we're going to fully be able to understand and identify those until we have more experience, but nonetheless, we need a framework in order to allow these projects to proceed. And I believe that this is a good framework at which we can start that process. And I certainly will be the first to admit that it's very quickly we'll be back in front of the board in the future with some suggested ways to improve this based upon some things that we've learned.

CHAIRMAN WELLES: Thank you.

MS. CAHN: I guess I would like to propose some wording changes to the computation modeling portion to say that if -- and I'm not exactly sure how to word it. Maybe we can get help on this from the state geologist's office. But maybe it could say something that if it's a closed system, transient modeling effects -- transient modeling effects will be -- or transient effects will be modeled, just something as simple as that, so that we're saying, okay, your defense is this is an open system. We're extracting fluids. We don't have to be concerned about this. But that's one place. So that's the Rock Springs Uplift. So what if we -- you know, to be protective for the state, maybe the requirement could be something as simple as that. We just add that in there.

MR. FREDERICK: Perfectly open to that. My analysis was intended to present the response to the conditions that were expressed by the Wyoming Outdoor Council in their comments. I'm sorry if I confused that by suggesting that the state geologist's response was intended for something other than that. So I see where you're going with that. And if you have some language to add to address that concern and that situation, I'd be more than happy to add it. I think it would be a good idea.

MS. CAHN: Do you have any comment on how that might be worded?

MR. QUILLINAN: I think if you look at line 19 under the modeling section, it says, anticipated operating data --

CHAIRMAN WELLES: Could you give us the page, too?

MR. QUILLINAN: Oh, sorry. It's 24-22 --

CHAIRMAN WELLES: Oh, same page.

MR. QUILLINAN: -- line 19.

CHAIRMAN WELLES: Okay. Same page.

MR. QUILLINAN: It's referring to injection pressures, rates and total volumes. That data would determine which type of modeling you would use. So I think it's in there, even though it doesn't say we want

you to use this model. Because if your pressures exceed the pressures of the rocks, you have to go to the other system. So the language is in there.

MS. CAHN: What do you mean, "the other system"?

MR. QUILLINAN: An open system. Because you -- your injection pressures, that determines on your injectability into the rock. And so that -- and if I remember right from the professor's article from Texas A and M, it was the injectability and the injection rates that were some of the major obstacles. So by looking at these characteristics of the formation, we'll determine if you can model a closed system or an open system.

MS. CAHN: What about in line 9, where it says pressure differentials -- pressure differentials sufficient to cause the movement of injected fluids or formation fluids into a USDW? In that case, we're talking about the pressure differentials and also talking about predict using computation. I think there's one issue of what your data tell you, and the second issue is how are you going to model based on the data that you have? And since the modeling actually comes first here, and then we talk that the model is going to be based on these kinds of data, then maybe it's an appropriate separate -- you know, once you've got the data --

anticipated operating data, including injection pressures, under 2, and then maybe a 3, Roman Numeral 3, that might say, if closed -- you know, if the data -- if the pressures are anticipated to be less than the formation pressures -- I mean, I don't know how to word it. Something like that -- and no fluids will be extracted, then the system will need to be modeled as a closed system and a transient -- you know, the transient effect of pressure in a closed system will need to be modeled, or something along those lines.

MR. FREDERICK: It may be a little more complex than that. And I'm just thinking out loud here. I would think that initially the computational model is going to be based upon a closed system. I think that that analysis then serves as the basis for determination -- or for determining whether fluid extraction is necessary or not, and if so, what that's going to look like in terms of where you need to extract fluid, how much you have to extract, and what fluid control systems, i.e., extraction, are needed. And at that point in time, I think you then morph or migrate from a closed-system model to an open-system model.

MS. CAHN: But again, we're talking about how do you handle the closed-system model? Because that's the concern that the professors raise. We're not

talking about how you handle the open-system model. Right?

MR. QUILLINAN: Right. I think what Kevin is saying is you start with the closed-system model. It's easier to do that.

MS. CAHN: To start with the steady-state, closed-system model?

MR. QUILLINAN: Yes. And then if it warrants it, then you move to an open system. Maybe the wording should say determine if formation fluid is needed to be extracted, something like that.

MR. WAGNER: Can I make a suggestion, Mr. Chairman? If we could maybe take a ten-minute break or so, fifteen-minute break, maybe the parties can sit down, work on some language and then go back on the record and see if -- if the language is something that is acceptable to everybody, we could just proceed. But I think it might be more efficient if people just kind of pulled up their chairs and sat down and worked on some language.

CHAIRMAN WELLES: That's fine with me.

MS. CAHN: I don't have a problem with that. And everybody in the room feel free to participate.

CHAIRMAN WELLES: Okay. We'll do that.

(Hearing proceedings recessed
11:00 a.m. to 11:46 a.m.)

CHAIRMAN WELLES: Okay. The Water and Waste Advisory Board will reconvene at, it looks like 11:45. And we were discussing the language of page 24-22, paragraph I, 4I. And during the interim, we sat down and discussed language and now have proposed language to adjust that paragraph. So is that how we want to go, Lorie?

MS. CAHN: Uh-huh. Yeah. I think while we're waiting for the computer to warm up, we'll go to other comments from the board and come back to this one.

MR. APPLEGATE: I just have a couple comments, Kevin. And I think I made these language comments before. So I just wanted to ask you one more time and get some explanation on them. One is on page 24-16.

MS. CAHN: 24, dash --

MR. APPLEGATE: 16. It's under the section for the permit application. And it is line 26. And my question is, if an applicant were to call you and ask you what was required when you say a compilation of all wells and other drill holes within and adjacent to the area of review, and down at line 32, again it says applicants shall identify the location of all known wells

within and adjacent to the area of review, then what would you tell that applicant is required in terms of adjacent, adjacent well information?

CHAIRMAN WELLES: In other words, a definition of what that encompasses.

MR. FREDERICK: It's a -- I'm trying to recall the context of the discussion we had last time.

MR. APPLEGATE: Let me provide a little more context. When it talks about a map delineating the area of review and it describes -- the area of review, in my mind, is already pretty encompassing as an area. Part of my comment goes to, I think the area of review is already comprehensive, in my mind, when I read what one's asked to do for the area of review. So when we bring in adjacent to the area of review, it's confusing to me. And I think an applicant is going to immediately raise that question and call the agency and say, "Tell us what's adjacent. What's the scope of our work here?"

CHAIRMAN WELLES: I would go one step further, and I would ask Shannon from a legal standpoint, because that's where it jumps out to me. If that ever goes to court and you have to define it, what does that mean?

MS. ANDERSON: Yeah. I mean, there's no definition of what adjacent would mean.

CHAIRMAN WELLES: That could be the whole state of Wyoming.

MS. ANDERSON: Yeah.

MR. APPLEGATE: Actually, I know that's in the enabling legislation.

MR. FREDERICK: That's right. That's what I wanted to point out.

MR. APPLEGATE: So it still raises a question that the agency has to have a position on what that is.

MR. FREDERICK: Sure. Sure.

CHAIRMAN WELLES: So it is in the legislation?

MS. CAHN: So is it something that you'll sit down ahead of time with an applicant and say, "This is what we consider the adjacent area, and we want you to address this area"?

MR. FREDERICK: I think it's reasonable to expect that, in delineating or modeling the area of review, that presumes that there's going to be some error -- some margin of error in actually establishing where that line actually falls. And I think the requirement for looking at wells within that defined area, as well as perhaps a reasonable distance outside of it, recognizes that there's an uncertainty where that

line is actually drawn. And I think the statute contemplated that uncertainty and said look within the area of review, as well as outside of it. Actually, the statute refers to the sequestration site adjacent -- the identification of all other drill holes and operating wells that exist within and adjacent to the proposed sequestration site. So in the context of their direction, I've applied it to the area of review.

Again, if we want to try and clarify or bring some certainty to what adjacent means, I would suggest limiting it to perhaps a mile beyond the area of review.

MR. APPLEGATE: That's actually something I had thought about, too, is perhaps a mile.

MS. CAHN: And we just define adjacent to in the definitions as --

MR. APPLEGATE: I just think it's going to have to be -- it's going to be almost an immediate question whenever there's the first permit application.

MR. FREDERICK: Sure. You're right.

MS. CAHN: Or even just say and adjacent within a mile to the area of review.

MR. FREDERICK: That would be my preference.

CHAIRMAN WELLES: I think you're setting yourself up for a problem legally, because each one of

these situations could be in a different geological type of area. And one mile in one area may be totally not comparable to another area, just because of the geology. Does that make sense?

MR. WAGNER: In support of what Mr. Welles is saying, we're getting back to the same issue. When you're writing regulations, sure, it's good to be definitive, and it's good to be direct and to say, okay, specifically this. But when you do that, you got to remember that you're restricting the agency's flexibility to respond to different situations.

MR. APPLEGATE: But as a potential -- I'm obviously speaking as someone who would represent the permit applicant. There are some cases where you'd like to have some degree of certainty on what scope you're being asked to do.

MR. WAGNER: And that's always the balance that we have to try to --

MS. CAHN: So maybe you would say within area of pre-agreed-upon?

MR. FREDERICK: We could flex a little bit by saying, at a minimum, within one mile of the area of review. Because I would think, in all cases, we would want to look at least within a mile. In other cases, we want to perhaps have the flexibility to look within two

miles or three miles.

CHAIRMAN WELLES: The reason I stated that, because I can think of several examples in the Powder River Basin where water has mysteriously appeared, and I know it's happened in Colorado, you know, miles and miles and miles away. And where did it come from? Everybody says don't know.

MR. APPLEGATE: So, Bill, you would have it just remain adjacent?

CHAIRMAN WELLES: I still think there needs to be some -- it should go back to the law. It should be defined, you know, "What does it mean, adjacent to?" somehow. But you don't want to restrict yourself to one mile.

MS. CAHN: How about, at a minimum, one mile?

CHAIRMAN WELLES: I don't know. I don't have the answer. But I can see the problem if you're trying to restrict it.

MR. APPLEGATE: I think a minimum of one mile at least gives the -- it gives the permittee a general idea. And then I'm assuming it also puts them in a position to discuss with you why you'd want more than a mile for that particular situation.

MR. WAGNER: When this comes before the

EQC, I'm going to say, "Dave Applegate suggested," with all your quotes.

MR. APPLEGATE: I'd be more than happy to --

MR. WAGNER: Just kidding.

MR. APPLEGATE: And my second comment is also a previous one. It's on page 24-21.

MR. FREDERICK: David, excuse me.

Mr. Chairman, before we go there, could I get precisely the language that should be changed on 24-16, line 32?

MR. APPLEGATE: It would be line 26 and line 32. In both cases, you use "adjacent to." And I think you could just put in parentheticals, "a minimum of one mile."

MS. CAHN: How about after the first sentence, after it says "and adjacent to the area of review," add a sentence that says, "adjacent to," in quotes, "in the context of this rule refers to a minimum of one mile," or something like that? And that way everywhere else it occurs where we say "adjacent to," you don't have to -- would that work?

MR. APPLEGATE: That's fine, too.

MS. CAHN: Or put it in the definitions.

MR. WAGNER: I think it would make more

sense to put it in the definition sections.

MS. CAHN: So make it "adjacent to the area of review," and then we know what we're talking about when we use the word "adjacent." So adjacent to the area of review refers to a minimum of one mile -- is a minimum of one mile. Or adjacent to the area of review encompasses one mile from the outer boundary, a minimum of one mile from the outer boundary.

MR. APPLEGATE: And the next comment I have is on page 24-21 under Section 8, "area of review and corrective action."

MS. CAHN: 24-21?

MR. APPLEGATE: Yes.

MS. CAHN: Line --

MR. APPLEGATE: Line 11. The paragraph says, "The owner or operator will reevaluate the area of review every two years during the operational life of the facility and then no less frequently than every five years for the life of the project." And what I had commented on previously was "life of the project" is not a term of definition in this regulation. And we talk about operational life, and then there's the talk of post-closure period. And we had recommended that "for the life of the project," be changed to "through the post-closure period." And I felt like that change of

language is more clear in terms of telling you -- I don't think we anticipate there being anything other than, quote, the operational life. Maybe I should ask that as a question. Is there any operational period or period of definition other than the operational life and the post-closure period?

MR. FREDERICK: Well, the long-term care period, I guess.

MR. APPLEGATE: See, this language is specifically a requirement of the operator.

MR. FREDERICK: Sure.

MR. APPLEGATE: And I want the language to be clear that once you're through the post-closure period, the operator is no longer required to do that. I mean, I think that's the -- I think what I'm saying is the general, you know, what was intended of this paragraph.

MR. FREDERICK: If we go to page 24-6, line 27, we modified -- or clarified, I should say, that same point with regard to the duration of the permit and that the permit is issued for the operating life of the facility and extends through the post-injection site care period until the project is closed in accordance with department rules and regulations. Is there some language there that we could then --

MR. APPLEGATE: Yeah. I think you could borrow that language that you have in red.

MS. CAHN: And then make it for the operating life of the project --

MR. APPLEGATE: And then no less --

MS. CAHN: -- of the facility and extend through post-injection. Just use the same language.

MR. APPLEGATE: No less frequently than every five years through the post-injection site care period until the geologic sequestration project is closed in accordance with department rules and regulations.

MR. FREDERICK: Yeah. That's the intent.

MR. APPLEGATE: And so I'm clear, after that, after that period, now the owner/operator is complete with the project, and the new legislation you talked about is this post-closure --

MR. FREDERICK: It's the long-term care period.

MR. APPLEGATE: And I do think we want to be clear on semantics here. Let me throw out how I understand these terms and see if we're on common ground. We have the operational life. Then we have a period of time where we have post-injection monitoring. Following that post-injection monitoring, then we have site closure. So operations, post-injection monitoring, site

closure. That's the end of the project for the operator/owner. Then we have post-closure monitoring that would be done by WDEQ as described in the proposed legislation. Is that correct?

MR. FREDERICK: Right.

MR. APPLEGATE: Post-injection site care period.

MS. ANDERSON: Do you have a copy of each piece handy?

MR. FREDERICK: Yeah. It's in the back of the document here.

MR. APPLEGATE: Which section talks about closure? Section 16. So I'm looking at that language. And I agree there's consistency there. We're using operating life, post-injection site care, site closure, and then the language from the new legislation.

MS. CAHN: So we could simplify it to post -- through the post-injection site care -- post-injection site care and site closure, rather than saying through the post-injection site care period until the geologic sequestration project is closed in accordance with department rules and regulations.

MR. APPLEGATE: I'm okay with that other language, though, since it's been used.

MS. CAHN: I was just going to simplify

it.

MR. APPLEGATE: I'm okay either way.

MS. CAHN: Since there is a whole section on post-injection site care and site closure, then page 24-21, Section 8 (a)(i), or little 1, I guess it is, could say the owner or operator will reevaluate the area of review, and I have, at least every two years. Because you have that in other places. Here you're saying two years, and other places you say at least, or at a minimum frequency of, or whatever. So I thought you should be consistent. And then during the operational life of the facility, and then no less frequently than every five years through the post-injection site care and site closure. Would that work?

MR. FREDERICK: Uh-huh.

MS. CAHN: Was I correct? In other places, you had the frequency was at least --

MR. FREDERICK: Probably. Yeah, probably.

MR. APPLEGATE: Those are the only comments I have.

MS. CAHN: Okay. Let's get going on mine. We're going to be here all day.

First thing to note, because it will come up in my comments, on page 24-3, we defined the long string casing as continuous from at least the top --

CHAIRMAN WELLES: What line are you on?

MS. CAHN: 24-3, line 36. We define the long string casing as continuous from at least the top of the injection interval, because that's not consistent in the document, so just note that, because we'll come back to that. And then also on page 24-4, the language about pressure front --

CHAIRMAN WELLES: Line 16.

MS. CAHN: Sorry. Line 16, yeah, pressure front. It doesn't go with -- we'll come back to that, as well. But where we talk about the pressure front meaning the zone of elevated pressure where there's -- it goes on to say where there's a pressure differential sufficient to cause movement of fluids into an USDW, et cetera. So we'll come back to that. Just note that.

And actually, minor editorial while we're on that page, line 23 on page 24-4, director of -- should "the department" there be capitalized, line 23? You guys are talking about the department. Shouldn't that be capitalized?

MR. FREDERICK: I would have to check to see whether we do or not.

MS. CAHN: I had a question -- actually, I do have one question on page 24-6, the top four lines -- three lines. It's EPA's wording. If the administrator

determines that USDWs will not be endangered, such wells are exempt, at the administrator's discretion, from the casing and cementing requirements. And are you comfortable with that? I mean, I'm wondering if we -- I guess I'm kind of thinking, what's the example where we would use that? I would think you would want to require casing and cementing requirements. I'm kind of wondering about deleting that.

MR. APPLEGATE: Where is that?

MS. CAHN: I'm on page 24-6, the first four lines, that we would exempt -- the administrator would exempt the applicant from casing and cementing requirements.

MR. APPLEGATE: I'm still not sure I see where you are.

MS. CAHN: Are you in the second set of -- are you in the annotated Chapter 24?

MR. WAGNER: 24-6 on the annotated version, first four lines at the top.

MS. CAHN: These in green.

MR. APPLEGATE: I'm sorry.

MS. CAHN: So this seems strange to me, that we would be exempting somebody from casing and cementing wells.

MR. FREDERICK: I don't think that was the

intent.

MS. CAHN: Section 9, construction and operation standards for Class 6 wells, and it refers to 9 (b)(i).

MR. FREDERICK: I think it's a recognition that the wells that they're talking about here, which are Class 1, Class 2 or Class 5 experimental or demonstration project wells, do have cementing and typically casing requirements as a condition for being permitted to begin with. Also, the administrator has discretion as to whether or not he wants to waive the more rigorous cement and casing requirements for the Class 6 wells or apply them to the existing Class 2, Class 5, Class 1 nonhazard wells. So they already have casing and cement in place. The administrator can require more rigorous Class 6 requirements if he wishes to.

MS. CAHN: I'm all right if you guys are okay. It just struck me as odd that we would want to exempt somebody from casing. I just thought, why would we?

MR. FREDERICK: Certainly the implication is that the Department reviews those casing and cement jobs for the existing wells and makes a determination as to whether they need to be more rigorous or not.

MS. CAHN: On page 24-14, line 25, what's

a SIC code, S-I-C?

MR. FREDERICK: Lorie, you're reading this way too closely. Excuse me. I'm joking. That's fair.

MS. CAHN: S-I-C code. Is that the code on the package? What is that?

MR. WAGNER: Standard industrialized code.

MR. FREDERICK: I think that's what it is.

MR. WAGNER: Standardized industrialized code, or industrial code. Like every industrial facility has a code of some kind.

MS. CAHN: Just do me a favor and spell it out.

MR. WAGNER: Where are you looking?

MS. CAHN: Line 25, page 24-14.

CHAIRMAN WELLES: And again, it should be under definitions.

MS. CAHN: You don't use it anywhere else. So just spell it out.

MR. WAGNER: I see. Yeah, it's the acronym that's giving you trouble?

MS. CAHN: It's the acronym. And then if it stands for standardized industrial codes, then you have codes, codes in here. So just get rid of one codes.

MR. WAGNER: Yeah. I mean, people talk about, what's his SIC code? People ask that question all

the time.

MS. CAHN: Yeah. But just spell it out. You can get rid of one code.

MR. FREDERICK: We did spell out NESHAPS on the following page.

MS. CAHN: NESHAPS, I know what that is. I work with that all the time. But I appreciate you spelling it out. National Emissions Standards for Hazardous Pollutants. It's actually Hazardous Air Pollutants. I'm not even sure this is right. I don't think you have it spelled out right. I think it's Hazardous Air Pollutants.

MR. FREDERICK: That's EPA's spelling.

MS. CAHN: Well, you need to look it up, because I think the "A" in there is for "air. National Emissions Standards for Hazardous Air Pollutants. And then when you've made an acronym out of it, your big S should be a little S. Don't let me look at it any closer. I already have lots of comments.

MR. WAGNER: From now on, when you send it to Lorie, give her about one day.

MS. CAHN: Like I say, my comments are not significant. But there are a significant number of insignificant comments that will make it more clear. Clarity is a good thing.

CHAIRMAN WELLES: I would like Shannon to report to her board that we're actually doing this.

MS. ANDERSON: Hey, you're doing a good job.

MS. CAHN: On page 24-18, this is line 8, where it just says a well bore schematic. And I'm confused at this point. Are we talking about something that's existing or something that's proposed?

MR. FREDERICK: Well, I believe it's existing, would be my understanding.

MS. CAHN: Okay. It's number little 20.

MR. APPLEGATE: This is on page 24-18?

MS. CAHN: 24-18, line 8.

MR. APPLEGATE: This is part of the permit application. So you're providing -- this is for wells you're going to construct.

MR. FREDERICK: Uh-huh.

CHAIRMAN WELLES: It goes back to Section 5, permit application.

MR. FREDERICK: That's right.

MS. CAHN: And so that's why it's a schematic, is because it hasn't been constructed yet? And so this is -- so you obviously won't have -- okay. I was just confused about where we were. So I don't need to see any changes there. Because if it was something

that was existing, I had a comment. But since it's proposed, I'm okay.

Page 24-20, and I think at line 5. So just let me understand. The applicant only keeps the data for three years, but then DEQ keeps the data until closure. Right?

MR. FREDERICK: That's standard.

MS. CAHN: I'm okay with that. I just didn't understand it. Because I saw later that DEQ -- my comment was, who's going to keep the data for the life of the project? And DEQ is. I just needed to understand that.

Okay. Line 24 on that same page. I had a question about it's a Class 5 geologic sequestration well. Construction, operation or maintenance of any nonexperimental Class 5 geologic sequestration well is prohibited. So is this just trying to say it has to be a Class 6? I'm confused.

MR. FREDERICK: No. I think, again, EPA's intent with the language here was to recognize that, prior to finalizing the federal rule, there may be situations where carbon sequestration pilot projects were permitted as Class 5 experimental project wells, with a possibility that they expanded beyond pilot-scale project wells to commercial operations still under a Class 5

permit. And I don't think that situation exists anywhere in the country. I think this was something that they put in there, anticipating the development of a situation that might exist when the rule was finalized.

MS. CAHN: So another way to word this would be the construction, operation or maintenance of any experimental Class 5 well for commercial use of geologic sequestration is prohibited. It's okay if it's an experimental thing. But if you go from experimental to nonexperimental, it can't -- I mean, I didn't understand what this said.

MR. FREDERICK: Without having an understanding of --

MS. CAHN: I thought if we could clarify what that means, it would be good. I mean, is it if you're going to do anything for geologic sequestration that's nonexperimental, it has to be Class 6? You can't do it as a Class 5? I don't understand what it means. I'm just trying to get at what it means.

MR. FREDERICK: Again, it's trying to speak to wells that may be in place at the time the rule is finalized. That's the population that it's talking about. The construction aspect they mention here, contemplating new wells after the development of this rule, I don't think is reasonably expected. I think

they're talking about, more precisely, operating and maintaining any existing nonexperimental Class 5 wells. We aren't going to have any, I don't believe, anticipating that the rule's going to move ahead at a reasonable schedule. We wouldn't take that approach. I think we would likely permit, in the event we had to, a Class 5 experimental well who wished to become commercially operational, in the absence of this rule, we'd probably permit it as a Class 1 nonhazardous well.

MS. CAHN: Can you say -- can we change the wording, then? I'm just trying to clarify what is meant there. So the construction of new or operating and maintaining any -- I'm sorry. The construction of new -- yeah, construction of new or operating and maintaining any existing nonexperimental Class 5 wells for geologic sequestration is prohibited. I don't know if that helps any.

MR. FREDERICK: Yeah, I think it does.

MS. CAHN: So you're not going to allow any new nonexperimental Class 5 wells. And you're not going to allow -- --

CHAIRMAN WELLES: Can we even change the EPA language?

MS. CAHN: Yeah, we can.

MR. FREDERICK: As long as it's as

stringent as theirs.

MS. CAHN: Yeah. We can be more stringent.

CHAIRMAN WELLES: All right. Yeah, I knew that. I just wasn't sure if --

MS. CAHN: Like I say, these are not intended to change the wording -- meaning. It's intended to make them more clear.

MR. FREDERICK: Sure. So how about if it read, the construction of new or operation or maintenance of any existing nonexperimental Class 5 geological sequestration wells is prohibited?

MS. CAHN: Or of any existing nonexperimental Class 5 wells for -- is it commercial geologic sequestration is prohibited? What are we prohibiting as these rules go into effect?

MR. FREDERICK: There's a variety of terms. You can move from pilot scale to commercial scale, pilot scale to field scale or full scale. I don't know if we want to get into the semantics here.

MS. CAHN: We don't want them to not maintain those. If they're going to operate them, then they have to be maintained. But what you're saying is if the use changes from an experimental to nonexperimental, then they're prohibited. Right? They have to be plugged

and abandoned, or they have to be --

MR. FREDERICK: Permitted under as a Class 6.

MS. CAHN: So maybe the construction of new or operation or maintenance of an existing nonexperimental Class 5 wells for -- okay. I've got a simpler way do it. Get rid of the "nonexperimental" before the "Class 5" and say, "The construction of new or operation or maintenance of any existing Class 5 wells for nonexperimental geologic sequestration is prohibited." In my mind, that says what --

MR. FREDERICK: That makes sense. We'll just have to define what we mean by nonexperimental.

MS. CAHN: Well, it's in there. So do I need to reread that, or has everybody got it?

MR. FREDERICK: Okay.

MS. CAHN: Back to the model, page 24-21, line 21. We talk about the model to be used. And I thought what if -- I guess I had questions about whether the model is publicly available or not and whether or not you need to know the name, version, who it's available from, just rather than saying, "including the model to be used." Somebody could say, "Oh, I've got a model called geologic sequest, and that's the model I'm using." And you don't know anything about that. You don't know who

developed it, what the version is. So I just wondered if we should be a little bit more specific in terms of the name, the version and the availability. You're going to want to have some confidence that either -- if it's commercially available, that you know what model number, version number. And if it's not commercially available, that it's something that somebody developed, that you have some reasonable access to it or something that would give you some confidence in the model. So I just thought more than just saying "including the model to be used," you know, parentheses, name, version, availability.

MR. FREDERICK: Right. I'm thinking the name or version of the model to be used.

MS. CAHN: Something about availability. Is it publicly available? Is it proprietary?

MR. FREDERICK: Sure.

MS. CAHN: On the same page, lines 30 and 31, I didn't understand how monitoring and operational data will be used to inform an area of review. I just don't know what "inform" means. So my proposed rewording is, "how monitoring and operational data, e.g., injection rate and pressure, will be used to reevaluate an area of review."

MR. WAGNER: Do you mean reevaluate or do you mean evaluate?

MS. CAHN: Well, the EPA's language said "will be used to inform an area of review reevaluation." So that's where I came up with reevaluate. But if it's just an evaluation -- if it's just an evaluation, it doesn't have to be reevaluate.

MR. FREDERICK: That's essentially the same outcome. I think your suggestion seems to clarify it a little bit with respect to --

MS. CAHN: We could get rid of "reevaluate." Say how monitoring and operational data, e.g., blah, blah, blah, will be used to evaluate an area of review. Now, this is one page where they do talk about computational modeling. So this may be a more appropriate place to make the changes, although I guess it's all in the same section. Actually, it's okay. We're in the same section that we were talking about before, making changes on the next page.

Page 24-22, line 35, 36 and 37. I think when you've written "displace formation fluids," do you mean "displaced formation fluids"? "Determine which abandoned wells in the area of review have been plugged in a manner that prevents the movement of carbon dioxide or displaced formation fluids."

MR. FREDERICK: Yeah.

MS. CAHN: So it's the movement of, one,

carbon dioxide or, two, displaced formation fluids. And I think if you put the one and the two in there, or the A and B or whatever, that that would help, because it got confusing when you're talking about you're preventing movement of carbon dioxide or displacing -- I mean, is it displacing? It got confusing. So I thought you're trying to prevent the movement of -- and I put a one or an A or something -- carbon dioxide or, two, displaced formation fluids. Because it gets confusing when you start talking about movement and you're talking about displacing fluids, and it gets muddled.

Does that make sense? Or if you don't want to do one or two or A and B, you can go -- after carbon dioxide, you can go, comma, and make a phrase, or displaced formation fluids, comma, that may endanger USDWs. Because I think it's the movement of that we're trying to figure out.

MR. FREDERICK: Right.

MS. CAHN: Page 24-23. And here's that -- I got really confused when you have "minimum frequencies not to exceed."

CHAIRMAN WELLES: What line are you on?

MS. CAHN: Top line, line 1 on page 24-23. I got confused with "minimum frequencies not to exceed." So I would suggest you don't need the minimum, and you

could replace it with "at a minimum" -- I'm sorry -- "at a fixed frequency, not to exceed two years." I don't think you need "minimum" in there. I think you could just --

MR. APPLEGATE: In that same paragraph, we use the term "life of the project." You might want to use that language we talked about earlier.

MS. CAHN: "So four or five years over the" --

MR. APPLEGATE: "Post-injection" --

MS. CAHN: -- "post-injection" --

MR. APPLEGATE: -- something, "until site closure." "Post-injection site care period until the project is closed."

MS. CAHN: I think you can just do a search for "life of the project" and make sure you catch that everywhere.

We're halfway through. Page 24-24, lines 37 through 41, a couple things. First thing is it needs to be a sentence. Because all the other things that have little -- this is little 5, or (v), and (iv) and (ii). They're all sentences. So I would add the word -- at the beginning of line 38, I would add "must be," and that will make it a sentence. So, "At least one long string casing, using a sufficient number of centralizers, must

be set in a manner so as to create a cement bond." And then it's a sentence. But we say in the first line "through the injection and combining zones." We're talking long string casing here. And the next line says "must extend to the injection zone." So which is it? Are we going through the injection and confining zones, or are we going to the injection zone?

And if you go to the definition that I referred to before, it says at least to the top of the injection zone. So I think that's what you mean. Rather than through the injection and confining zones, I think you mean to create a cement bond through the -- or at least to the top of the injection zone.

It's not you. Sorry. EPA. And I'll refer you back to page 24-3, where our definition of long string casing is -- this is line 36 on 24-3 -- "means a casing which is continuous from at least the top of the injection interval to the surface and which is cemented in place." So our definition is "at least to the top of the injection interval," and here we're saying "through the injection and confining zones." So is it through the injection zone, or is it at least to the top of the injection zone?

And I think -- I don't know if you intend to have your long string casing going all the way through

the injection zone. I would think you've got to get into the top of it. If you go all the way through it, then you can't inject into your long string casing.

MS. ANDERSON: And the confining zone may be below the injection, as well. It's above and below. So you wouldn't have it --

MR. APPLEGATE: Yeah. I think -- of course, I'm not sure. The first sentence maybe could be changed. At least one long string casing, using a sufficient number of centralizers, set in a manner so as to create a cement bond through the confining zones and to the top of the injection zones.

MS. CAHN: But you can only do it through if your confining zone is above.

MR. APPLEGATE: Well, you're not going to -- you can't say anything -- you're not going to have any casing through the bottom confining zone.

MS. CAHN: Yeah. So maybe we need to say overlying confining zones and not through the injection. It's through the overlying confining zones and into the top -- at least into the top of the injection zone.

MR. QUILLINAN: I wonder if this is written that there may be multiple injection points along the well bore.

MS. CAHN: I don't know. I didn't

understand what it says. But that's a good point. Well, it's only talking about one injection zone, and it's talking about potentially multiple confining zones. But why would you drill into -- if your confining zone is below where you're injecting, why would you drill into it?

MR. APPLEGATE: That's what I was saying.

MR. QUILLINAN: Right. Well, some of these wells might be drilled down that deep just to sample the rock and either plugged back up or -- so I can see why maybe they chose this one.

MS. CAHN: This says your construction and operation standards for Class 6 wells.

MS. ANDERSON: I think any wells that were drilled into the lower confining zone to test rock would be part of the exploration phase.

MR. FREDERICK: I see the subtle contradiction. But I don't know that there's anything here that isn't true. I think they're speaking to injection -- excuse me -- cement bond through the injection and confining zone and that the long string casing must extend to the injection zone isolated. I guess I'm not really seeing any contradictions here.

MS. CAHN: There's one long string casing. The contradiction is the first sentence says you're going

to cement it all the way through the injection zone, through. And the second one says just extend to the injection zone.

MR. FREDERICK: Right. You're right.

MS. CAHN: That's the contradiction.

MR. FREDERICK: That would be the contradiction.

MS. CAHN: That's what I'm talking about.

CHAIRMAN WELLES: So you're talking about the "through" in line 34?

MS. CAHN: I'm talking about "through" in line 34 is inconsistent with the "to" in line 39 and the definition of long string casing in the definitions.

MR. FREDERICK: The "through" in line 38. Right?

MS. CAHN: Is where I have a problem.

MR. QUILLINAN: Where was the long string casing definition?

MS. CAHN: It's on page 24-3, line 36. And that's where I drew your attention to at the beginning, where it says, "which is continuous from at least the top of the injection interval to the surface." I think we could fix it by saying, "so as to create a cement bond through the confining zone, the overlying confining zone, and at least to the injection zone."

MR. FREDERICK: Through the overlying confining zones and through --

MS. CAHN: And actually, since the second sentence covers the injection zone, I would just leave injection zone out of the first sentence. So the first sentence would read, "At least one long string casing, using a sufficient number of centralizers, must be set in a manner so as to create a cement bond through the overlying confining zones." And then the next sentence could stay as is. "The long string casing must extend to the injection zone and must be isolated by placing cement" --

MR. FREDERICK: I agree that that's simpler.

MS. CAHN: Okay. We're almost done. I just had an editorial on page 24-29, line 20. Since your oxygen activation is a log, I would get rid of "logging or" and put a comma after "oxygen activation," comma, "temperature," comma, "or noise logs." So it would read, "e.g., including diagnostic surveys such as oxygen activation, temperature or noise logs."

MR. FREDERICK: You should be teaching English.

MR. APPLEGATE: Don't you want the comma after e.g.?

MS. CAHN: What's that?

MR. APPLEGATE: A comma after e.g.?

MS. CAHN: Yes, you should have a comma after e.g.

MS. ANDERSON: We're going to send these to EPA when you're done, Lorie.

MS. CAHN: I know. A lot of my comments are on EPA.

MR. FREDERICK: I think it can be either way.

CHAIRMAN WELLES: I have a suggestion. Next time send it to Lorie first.

MR. APPLEGATE: You might want to do an internal review.

CHAIRMAN WELLES: But you're going to have to increase your wages. You understand that?

MS. CAHN: Right. From nothing to nothing.

Page 24-31, line 25 and 26. It says "as warranted by a risk assessment." And I'm just confused by -- when I think of risk assessments, I'm thinking in the circular world of risk, ten to minus four, ten to minus six. And I don't really think -- that's obviously not what you intend.

MR. APPLEGATE: Is that new language?

MS. CAHN: What's that?

MR. APPLEGATE: Has that language been in here? Has that language been in the document?

MS. CAHN: No. I think it's new in the black. It's something the Department added. And so I was curious what you meant by a risk assessment. And maybe we could use some other language besides -- I mean, you're trying to figure out what the risks are. But you're not meaning a risk assessment like some baseline risk assessment.

MR. APPLEGATE: I think you could delete the words "as warranted by a risk assessment," and you would still have the meaning. You're basically using all of those factors to determine --

MR. FREDERICK: Right. It's somewhat redundant, isn't it?

MS. CAHN: Yeah. I'd be happy with just --

CHAIRMAN WELLES: So just cross it out? We all agree?

MR. FREDERICK: Yes.

MS. CAHN: Same page, line 41. I got very confused by "pressure front." And I'll see if I can explain why I'm confused. On the line before, 24-30 -- or page before, on line 15, this is where this whole list

of things begins. "Testing and monitoring associated with geologic sequestration projects must, at a minimum, include," and then we get to, "Testing and monitoring to track the extent of the carbon dioxide plume and the position of the pressure front." But the definition of a pressure front on page 24-4 doesn't fit with -- so what you're trying to do is you're trying to track the extent and position of the pressure front. But a pressure front is defined as something that is sufficient -- pressure differential sufficient to cause movement of injected fluids or formation fluids into a USDW. And I think what you're trying to do is prevent a pressure front from moving into a USDW.

So I think it's really kind of dangerous to have something moving into the USDW and something that you're trying to test, and it's okay, because you don't want it to move to the USDW. So I think we have to work on the definition of pressure front. What you're talking about is a front that has enough pressure in it that it could do some harm. And so you have to be protective of USDW.

So I think our definition -- and that's why I want to go back to page 24-4. The language that was added about "into an underground" at our last board meeting -- and I think it was based on comments from the

Wyoming Outdoor Council, as I recall. Actually, I don't remember. I think we made a mistake by adding that language in. And I think it needs to come out.

MR. FREDERICK: I see the -- yeah. I see the point you're trying to make. It's pretty subtle.

MS. CAHN: It's a pressure front that's of sufficient pressures in order to cause to -- to threaten. And so we need to really do due diligence in making sure that it doesn't move into underground --

MR. FREDERICK: Right.

MS. CAHN: So I think our -- the pressure front is really the area of high pressures. I don't know how to word it correctly. But I think we have to work on the definition of pressure front. Because otherwise, it looks like, in this language, then it's okay that it moves into a USDW. And that's not okay.

MR. FREDERICK: Where's the language that implies that it's okay?

MS. CAHN: Well, it goes on. There's other places in it. So this is saying, okay, so test and monitor to track the extent of the plume and the position of the pressure front. And the pressure front is defined as something that's got enough pressure that it's moving into a USDW. So I think we need to work on our definition first.

MR. QUILLINAN: The problem comes in the blue at the end.

MS. CAHN: Exactly. Exactly. So I think we need to remove the blue completely on page 24-4 on line 19 and 20. I think without that language -- and actually, "environment" is spelled wrong, but we're going to delete it, anyways.

CHAIRMAN WELLES: Details.

MS. CAHN: More importantly, I don't think it's proper to have that blue in there. And that's why I said I wanted to come back to it. So I think if we -- is everybody okay with striking the blue on line 19 and 20 on page 24-4?

CHAIRMAN WELLES: I'm okay with it. But where did it come from? You think that came from --

MS. CAHN: We'd have to go back to the meeting.

MR. FREDERICK: No. I think that was my recommendation.

CHAIRMAN WELLES: Now we might have a problem.

MR. FREDERICK: Well, I didn't see the conflict that it set up with --

MS. CAHN: It's coming.

MR. FREDERICK: I think I'm okay with

deleting that.

MS. CAHN: That solves a lot of my remaining comments.

Next page, 24-32. So we have risk-based factors again.

MR. APPLEGATE: Can I bring that issue up again? Because that was actually an Anadarko --

MS. CAHN: That was what?

MR. APPLEGATE: It was an Anadarko comment. It says the language that -- here was our comment. First let me give you the language. Pressure front means a zone of elevated pressure that is created by the injection of the carbon dioxide plume in the subsurface where there's a pressure differential sufficient to cause movement of carbon dioxide or formation fluids from the injection zone into a USDW.

Our comment had been, why did the DEQ significantly differ in language from the EPA regarding the pressure fronts sufficient to cause a movement of injected fluids into a USDW? By the DEQ's currently proposed definition of area of review, they encompass an extremely large area and ignore the primary concern of protection of USDWs. APC recommends using the GWPC's definition of pressure front.

See, I remember this now. Somehow this is -- I

don't understand the details. Because this comment comes from some other folks that had reviewed this for us. But I think it had to do with the difference between the pressure front being -- if there's pressure everywhere you're injecting, we didn't want pressure front just to be measurable pressure, but where there's a certain magnitude of pressure.

MS. CAHN: So elevated pressure.

MR. FREDERICK: Sufficient to move formation fluids.

MS. CAHN: And I think we've got that in there, that there is a zone -- pressure front refers to a zone --

MR. APPLEGATE: Somehow the inclusion of the USDW was important.

MS. CAHN: That it was associated with the USDW?

MR. APPLEGATE: Yeah. And I think it has to do with -- I really cannot explain this fully. But my general understanding was that we didn't want pressure front defined as any measurable pressure, but pressure of a certain magnitude. Where is the area --

CHAIRMAN WELLES: So you want to just define it so it doesn't go on forever and forever.

MR. APPLEGATE: I think the concern was

that you could have -- that you could be seeing slight pressures at very large distances and that what you were concerned about for the pressure front is just those areas --

MS. CAHN: That could cause movements of injected fluids or formation fluids. Wherever you have sufficient pressure to move injected fluids or formation fluids, that's your pressure front.

MR. APPLEGATE: The language that added -- GWPC, who is that?

MR. FREDERICK: That's the Ground Water Protection Council.

MR. APPLEGATE: So this is the council that has been involved in the EPA regulations for a long period of time. And they wanted to include this idea of it moving into a USDW. So I cannot -- I can't explain to you the rationale for that. I'm just saying that this language, this definition of pressure front, has lots of background and history to it. The part that was added, I believe, Kevin, that you added, was "or otherwise threatens human health, safety or environment."

MR. FREDERICK: Right.

MS. CAHN: But I think what we're trying to do is to prevent the movement into the USDW. And so I think if you define pressure front as something that's

got enough pressure that it will or can move into the USDW, then I think we're running -- it's not the right place for the -- I mean, the way it's worded is where there was pressure differential sufficient to cause movement into a USDW. And that's where I think --

MR. APPLEGATE: And that's the definition that was part of this Ground Water Protection Council's recommendation. I can't explain that. I just know that that language has been through -- and it says here it was part of the -- it's the EPA. There's a lot of history in that language, is all I'm saying. So I can't understand -- I can't explain, either, how it ties back to 24-31.

MS. CAHN: I think one is a definition of what's a pressure front. And that's in the definitions. And I think we have to be very careful not to define it as something that causes movement into a USDW. What we're trying to do is prevent its movement into a USDW. And that's clear in other places within here. But otherwise, the only pressure fronts you have are things that do move into USDWs. And we're trying to prevent that. So I think it puts us in a very weird catch-22.

MR. APPLEGATE: Yeah. I'm very uncomfortable making any change in this language until I talk to some of our technical resources that understood

the history of this. I certainly understand your logical disconnect with the language, but there were some technical reasons, I think, for having pressure front defined as a magnitude, a certain magnitude of pressure. And I just don't fully understand those.

MR. FREDERICK: I think there are situations where you will have pressures associated with injection that, especially when injection is occurring into a non-USDW, are likely to pose little, if any, threat to a USDW or to human health, safety and the environment. So in those situations --

MR. APPLEGATE: I think this was if there was enough pressure if there was a conduit, meaning there's a confining layer. So the pressure front is where there's enough pressure that that pressure, if there were a pathway, could allow the migration of the CO2 to the USDW. But because there's --

MS. CAHN: This says to cause movement. It's saying the pressure front --

MR. APPLEGATE: If there were a fault or if there were a channel.

MS. CAHN: But it doesn't say if.

MR. APPLEGATE: But the pressure front, when you inject, there's enough pressure down there that that fluid, if there was an open conduit and no

resistance, that it could move that distance. So you have high pressures in these systems that, without the confining layers and all the protections that are put in place, the pressure -- so that's why this pressure front is defined as a -- that goes to the issue of why the pressure front has a definition of a certain magnitude.

I'm not explaining myself very well here. You only have migration to the USDW if you have conduits which allow migration of that fluid. That is protected by the surface, by the cementing in the wells and the geologic confining layers. So when you're measuring the pressure front in the subsurface, think of it as these concentric circles of pressure. You're injecting in your injection zones. You have very high pressure. You have pressures in close proximity to that well, or some distance from that injection point, where those pressures, if there were a conduit, they could reach the USDW.

As you get out further and further, you still have pressure measurement, but those pressures no longer have the magnitude that would allow them through an open conduit to get to the USDW.

MS. CAHN: So maybe we need to add the language through -- you know, if a conduit were available, could cause movement of injected fluids into a

USDW. Then I wouldn't have a problem with it. It's just that this says the pressure sufficient to cause movement. And so if we could add in if a conduit were available or something, if a conduit existed. So now we're talking about sufficient pressures to cause movement if that conduit exists.

MR. APPLEGATE: That's how I understand it.

MS. CAHN: I feel okay with that. I just don't think you want to define it as something --

MR. APPLEGATE: I still would feel more comfortable talking to a geological engineer or a petroleum engineer.

MR. CAHN: -- that causes movement into a USDW.

MR. WAGNER: Here's what I'm concerned about, is you're uncomfortable changing it without having further discussion with the technical people that understand this better.

But it sounds like it's a big issue for you. And I'm concerned that we're not going to be able to move the rule forward unless one or the other gives some ground. And I'm wondering, because you know that there's an Environmental Quality Council opportunity to address this issue, whether you would be willing to accept

Lorie's changes for the purposes of moving it forward to the Environmental Quality Council. Then your technical people could maybe bring forth the argument before the Council.

MR. APPLEGATE: Yeah, I'm open with that.

MS. CAHN: If there's a conduit? If a conduit exists?

MR. APPLEGATE: Then it's going to raise the question of what's a conduit?

MS. CAHN: Well, I think the whole point is the "if" has to come in there. It's not that it's causing movement into a USDW.

MR. APPLEGATE: I understand that. I don't disagree with you.

MS. CAHN: As long as we put some language together that has "if" in it, I'm okay with leaving all that stuff in there.

MR. APPLEGATE: Kevin, with this back and forth, is it making you think about what the language was?

MR. FREDERICK: Doesn't the term sufficient to cause movement of injected fluids -- if there is no conduit, then it's not sufficient. It's implied that there's a conduit if it's sufficient to move fluids.

MR. APPLEGATE: I think we have to think about, when you're measuring pressure in the subsurface, how do you define -- this is a definition of what is the extent of that pressure movement. Theoretically, you're -- I'm back to where Lorie is here. You're assuming you don't have any location where you're actually going to be --

MS. CAHN: Then you have no pressure front.

MR. APPLEGATE: Then you would have no pressure front. Her point would be --

MS. CAHN: If it's not moving in through a USDW, there's no pressure front, by this definition. And I think you want the opposite. I think you want to define a pressure front only where you don't -- I mean, you want it to be -- you don't want to have movement in through a USDW or threaten human health, safety or the environment. So you've got -- you shot what you're trying to prevent happening as part of the definition of what it is. And that is a problem. Because the intent of this regulation is to prevent movement of a pressure front into a USDW, or otherwise threatens human health, safety, environment.

MR. WAGNER: So what is your suggested language?

MS. CAHN: Well, my suggested language was to take out the blue. And then I think we --

MR. QUILLINAN: Then you have to have -- it has to have a magnitude at some point.

MR. APPLEGATE: Taking out the blue is definitely a concern for me.

MS. CAHN: A problem for you? Okay.

MR. APPLEGATE: I think if we added something like there's a pressure differential sufficient to cause movement of the injected fluids or formation fluids if a migration pathway or a conduit were available --

MS. CAHN: I'm okay with that.

MR. APPLEGATE: Although I got to be honest. I'm not fully convinced that I understand this issue to suggest that language change.

CHAIRMAN WELLES: But if we do that and substitute or inject that language, it can still be caught and reviewed at EQC. So that would move us forward today. Right?

MS. CAHN: Yeah. So we would put language in after the end of the black on page 24-4, line 19, at the end of the black, so after "injected fluids or formation fluids," "if a migration pathway or conduit were available."

CHAIRMAN WELLES: "If a migration" --

MS. CAHN: "Pathway" --

CHAIRMAN WELLES: -- "pathway" --

MS. CAHN: -- "or conduit" --

CHAIRMAN WELLES: -- "or conduit."

MS. CAHN: And that's what you said?

MR. APPLEGATE: Yeah.

MS. CAHN: I'm just using Dave's words -- "were available," comma. Or not comma. And then we could use the blue, "into an underground source of drinking water, or otherwise threatens human health, safety, or the environment." And then I'm okay with it.

MR. APPLEGATE: So I think those are the areas of injections that you're concerned about, because those are the areas where you have high enough pressure in the subsurface that you could potentially --

MS. CAHN: Do some harm.

MR. APPLEGATE: -- do harm if you didn't plug a well or if you had a --

MS. CAHN: That resolves my issue with the pressure front. It turns it into an if, and that's what I needed. So if you're okay with it, if everybody's okay with that, I'm okay.

MR. FREDERICK: What was the language again?

MS. CAHN: After -- on line 19, after the black, "if a migration pathway or conduit were available," or we could just say, "if a migration pathway or conduit existed." Put "exists" or something.

MR. FREDERICK: "Exists"?

MR. APPLEGATE: "If it were to exist."

MS. CAHN: Actually, "were available" is probably better, I guess, huh?

MR. APPLEGATE: "Or were to exist," is probably --

CHAIRMAN WELLES: Yeah, I think "were to exist" sounds better.

MR. APPLEGATE: Because you are assuming it does not exist. That's why you permitted the project as you did.

MR. QUILLINAN: You only have to monitor pressure front in areas that is of --

MR. APPLEGATE: Well, by definition, you're measuring the pressure front, and by definition, the pressure front is that part of the injection field where the pressure's sufficiently high enough to reach that USDW.

MS. CAHN: This language of "otherwise threatens human health, safety or the environment," I know we went round and round about that last time. What

does that mean? I mean, other than going into a USDW, do we know what that means?

MR. FREDERICK: Well, yes. It is, essentially, statutory. So, for the record, 35-11-313, Section F, little (i), follows from the statutory authority language that says the director of DEQ shall -- excuse me. The administrator of the Water Quality Division shall recommend to the director rules, regulations and standards for the creation of subclasses of wells within the existing UIC program to protect human health, safety and the environment and allow for the permitting of geologic sequestration of carbon dioxide.

So we're trying to recognize that in Wyoming, at least, the goal isn't only to protect aquifers with less than 10,000 milligrams per liter TDS. It's broader than that.

CHAIRMAN WELLES: Moving on.

MS. CAHN: Moving on. Okay. Page 24-32, line 1, first part says, "At the administrator's discretion." And that does not fit with page 24. If you follow the 9 up to its origin, which is on page 24-30, line 15 and 16, it says, "Testing and monitoring associated with geologic sequestration projects must, at a minimum, include." And now we're talking about something that isn't must, at a minimum, include. It's

at the administrator's discretion. So my suggestion is you take it out of 9, because now you're talking about something -- you've got a list of things that are -- so I would make a new A. Make it A, and A becomes B, and B becomes C, or whatever.

CHAIRMAN WELLES: So you're deleting, "At the administrator's" --

MS. CAHN: No. It is at the administrator's discretion, but it is in a list of things that have to include at a minimum. And now the administrator can say we don't have to do this.

MR. FREDERICK: It will be become a small Section C.

CHAIRMAN WELLES: Small Section C comes before, "At the administrator's discretion"?

MS. CAHN: Or D. I'm not sure what -- yeah.

CHAIRMAN WELLES: Small C?

MS. CAHN: Yeah, instead of 9 or whatever. I mean, I don't know what the proper --

MR. FREDERICK: We will get it structured right.

MR. APPLEGATE: So here again, you've added these terms "risk-based factors," "risk assessment."

MS. CAHN: Yeah. That was my next comment.

MR. APPLEGATE: I think you can say there, "At the administrator's discretion, based on site-specific conditions, surface air monitoring and/or soil gas" -- I don't think you need to say "and risk-based factors." Just kind of raises a question.

MS. CAHN: So are we getting rid of "risk-based factors"? I didn't hear what he said.

MR. APPLEGATE: Yes.

MS. CAHN: That takes care of my next comment.

MR. APPLEGATE: And to anticipate your next one, I would delete the words "risk assessment."

MR. FREDERICK: I was going to say that.

CHAIRMAN WELLES: That's line 6.

MS. CAHN: And the "risk-based factors" was on line 2. Next line down, 9. Okay. There was an entire paragraph -- sentence that was a paragraph. And I got lost. So my suggestion is, on line 9, in the middle, towards the -- two-thirds along the way of the sentence after "baseline data," make a period. And then get rid of "and." The "the" becomes capitalized. And then say, "The monitoring plan must," add the word "specify," and get rid of the word "include."

Go down to line 11. And after "delineation," I don't think we need the "or." It's "delineation and the potential," and add after "the" "potential movement." So this would now read, "The monitoring frequency and spacial distribution of surface area monitoring and/or soil gas monitoring must reflect baseline data. The monitoring plan must specify how the proposed monitoring will yield useful information on the area of review delineation and the potential movement of fluid containing any contaminant into underground sources of drinking water," et cetera, et cetera.

And there we're talking -- now we're not -- so that's why I think "potential" is important, rather than say we're going to delineate the movement of this into USDW. We want to delineate the potential. We don't want it to happen. And I'll give you my hard copy.

MR. APPLEGATE: Can we just change it to "USDW," rather than "underground sources of drinking water"?

MS. CAHN: Yes, because we've already defined it.

CHAIRMAN WELLES: So where does that go in?

MS. CAHN: Line 11. Get rid of "underground sources of drinking water" and just say

"USDW."

On line 16, we have -- at the end of the line, we have "area of review evaluation." And I think we can get rid of the word "evaluation," so it's just the "area of review." Because what we're modeling is the area of review, not the area of review evaluation.

MR. FREDERICK: Well, I believe there is periodic reevaluation.

MR. APPLEGATE: That's the reevaluation. I think what that means is you've got an area of review, but you now are doing this ongoing monitoring, and they could ask you to do additional monitoring that would be used in the area of review reevaluation.

MR. FREDERICK: Right.

MS. CAHN: Are we on the evaluation or the reevaluation?

MR. APPLEGATE: This is the reevaluation, because you have the original area of review, and every two to five -- every two years you're doing the reevaluation. So I think I would put "RE" in front of evaluation. Seems pretty minor. See, it refers you back to Section 8(b), too.

MR. FREDERICK: Reevaluate.

MR. APPLEGATE: So we're going to add "RE." It's small, but gives us the same terminology.

MS. CAHN: What was 8(b)?

MR. APPLEGATE: Where we had talked about area of review, page 24-21.

MS. CAHN: Now we're doing the reevaluation?

MR. APPLEGATE: Yeah.

MS. CAHN: I'm okay with reevaluation.

Page 24-34, line 6, the area of review is -- line 6 on page 24-34, the area of review is an area. And the thing that the owner or operator must update is the area of review and corrective action plan. So I think we've left out "and corrective action plan." It's a plan we're updating. There's a lot of places where "and corrective action plan" has been left out of this. Area of review is an area.

MR. APPLEGATE: Yeah. But that's what you're updating.

MS. CAHN: But you're updating -- but where you put the area of review in is in the area of review and corrective action plan. Right?

MR. APPLEGATE: Yeah. But I think the area of review is what's changing. That size of the area is what changes with the reevaluation.

MS. CAHN: But how do you prepare, maintain, update an area of review when area of review is

defined on page --

MR. FREDERICK: Lorie, I think the structure of the sentence here is what's the problem, what the problem is. It's saying that they have to prepare, maintain and comply with the well plugging plan and update it on the same schedule as the update to the area of review.

MS. CAHN: But is the area of review a report, a plan, a document? If you look at area of review definition on page 24-1, area of review means the subsurface three-dimensional extent of the carbon dioxide plume, associated pressure front, and displaced fluids, as well as the overlying formations and surface area above that delineated region.

So the area of review is a physical area?

MR. APPLEGATE: Yeah. It's a map. That's what I see it as.

MR. FREDERICK: A delineated.

MR. APPLEGATE: A delineated three-dimensional map.

MS. CAHN: Well, this doesn't say the delineation of it. It says it is the subsurface three-dimensional extent of the carbon. So, in my mind, it's a physical thing. And what you update is a map of it, a plan of it, a report on it, something. We don't

have something called area of review that is a report, a plan, I mean, unless our definition is wrong. Maybe area of review needs to be capital A, capital R, and it means a document that was given to DEQ.

Everybody is going to get low blood sugar here. I'm almost done.

CHAIRMAN WELLES: I think John already did.

MR. APPLEGATE: I do agree with you that it's a physical thing. So what you provide is a representation of that physical thing. Right?

MS. CAHN: But anywhere I could find what we submit to DEQ, it was always called an area of review and corrective action plan. And so unless I'm mistaken --

MR. APPLEGATE: What's it say under the original permit application? See, there it says a map delineating the area of review.

MS. CAHN: Section 8 is called area of review and corrective action.

CHAIRMAN WELLES: Section 9?

MS. CAHN: Section 8 on page 24-1 -- 21. Sorry. 24-21 describes the area of review and corrective action. But I don't know if that's --

CHAIRMAN WELLES: I don't even have that

page.

MS. CAHN: You don't have page 24-21?

CHAIRMAN WELLES: Oh, I do. Okay. No, I don't. Wrong section.

MS. CAHN: I mean, we've got permits required, Section 4. Section 5 is permit application. 6 is prohibitions. 7 is minimum criteria for siting wells. 8's the first place it talks about area of review and corrective action.

CHAIRMAN WELLES: So what you're saying is that doesn't compute with the definition of area of review?

MS. CAHN: Yeah. Area of review is a physical thing. And I think anything that's submitted to you with area review in the title is called area of review and corrective action.

MR. APPLEGATE: That part I don't agree with.

MS. CAHN: You don't agree with it?

MR. APPLEGATE: But let me give you why I think I just have a difference on that. Area of review is a permit requirement talked about on page 24-15. It says a map delineating the area of review. This section here, Section 8, I think is confusing in the title because it's talking about two different things. It's

talking about an area of review -- review because you're reevaluating it every couple years. And the corrective actions that you would do -- the corrective action, part of that is just the last paragraph on page 24-22. There's a little paragraph (d).

MR. FREDERICK: No. It's actually 24-21, line 33, I think is where the discussion on corrective action starts.

MR. APPLEGATE: But an area of review is not -- an area of review is separate from, and the change of that every two years is separate from the corrective action plan, which you could have just as easily had two sections here, one that said area of review reevaluation and had another section that said corrective action. Because, to me, they're too different topics that just happen to be in the same section.

MS. CAHN: But the corrective action is submitted with the area of review, because it says a description of the monitoring -- how operational monitoring data will be used, how corrective action will be conducted.

MR. APPLEGATE: Yeah. But see that paragraph B that you just read, "How monitoring and operational data will be used to inform" -- I think we changed that earlier, didn't we? -- "an area of review

reevaluation." So that's an activity where you change the area of review map. And in the next section -- you see paragraph 3 there, "How corrective action will be adjusted if there are changes in the area of review," to me, is the only kind of connection there.

MS. CAHN: So when you submit your first area of review, you have to have -- a corrective action has to be part of it. Because it says prior to injection. What corrective action will be performed prior to injection?

MR. APPLEGATE: You have old well borings, existing well borings, that you're going to have to go in and perhaps plug. I think that's part of what's corrective action. And if your area of review changed and got -- let's say it was bigger now than you had thought. Well, then maybe you would have to go in and do corrective action on some well bores that were not part of your original area of review.

MS. CAHN: But is the area of review an application? Is it a report? Is it a map? Is it a -- what is it we're updating?

MR. FREDERICK: It's essentially as it's defined. What's being updated is the determination of that area.

MS. CAHN: Can we call it an area of

review determination, something that's other than an area?

MR. FREDERICK: Yes.

MS. CAHN: So then I think if you introduce in the area of review and corrective action that there is an area of review determination, then I think here, if we just added the word -- instead of corrective action plan, we add the word "determination."

MR. APPLEGATE: I agree with that, too.

MS. CAHN: You do or don't?

MR. APPLEGATE: I do. You're changing the title of Section 8, as well?

MS. CAHN: Yeah. It should be area of review determination.

CHAIRMAN WELLES: What page are we on now?

MS. CAHN: On page 24-21, line 4. And then I think just look for --

CHAIRMAN WELLES: Area of review determination?

MS. CAHN: Yeah. Or determination of area review and corrective action.

CHAIRMAN WELLES: Which way do you want it?

MR. FREDERICK: You don't like the way it reads, "area of review and corrective action," now?

MS. CAHN: Well, he doesn't like corrective action being part of the area of review. And I'm saying if they're submitting something to you, it's got to have a name. Because area of review is defined as --

MR. APPLEGATE: As an area.

MS. CAHN: -- a physical area, not a document. So we either change the definition of area of review -- which I don't think you want to do --

MR. FREDERICK: No.

MS. CAHN: -- because there's a physical area that you're reviewing.

CHAIRMAN WELLES: So you could put determination of --

MS. CAHN: Of area of review.

MR. APPLEGATE: Or you could call it area of review reevaluation if you wanted to use the same language that's in the text below.

MS. CAHN: Well, this is the original area of review and the -- it could be area of review evaluation. It's just got to be something. I don't care what you call it.

MR. APPLEGATE: I hear you. The Section 8, I think, really is not talking about the original exercise which is talked about back in the permit

application.

MS. CAHN: So do we want to call this thing the area of review reevaluation?

MR. FREDERICK: I think it's both, if we look at line 14, for instance, 13 and 14, 24-21.

CHAIRMAN WELLES: "To delineate the area of review."

MS. CAHN: So is it the area of review delineation?

MR. FREDERICK: Read on. And then it talks about reevaluate --

CHAIRMAN WELLES: Reevaluate --

MR. FREDERICK: -- the delineation and perform corrective action that meets the requirements of this section. If you want to change the title, perhaps area of review determinations.

MS. CAHN: Or delineation.

MR. FREDERICK: Delineation and corrective action.

MS. CAHN: I'm okay with that, as long as it's something.

MR. APPLEGATE: That addresses her comment and keeps whole my comment, which is that they're two different things. The determination of the area of review is different than the corrective action that may

accompany that delineation.

MR. FREDERICK: Yes.

MS. CAHN: And then whatever language you choose, if it's delineation, then 24-34 would be the same. And I would just do a search for "area of review," because that gets out a lot of my other comments.

MR. FREDERICK: So you would like to see wherever "area of review" --

MS. CAHN: Look and see if you're talking about the physical area or you're talking about something that is a document that's being submitted to you. If it's a document that's being submitted to you, call it something. If it's the area --

MR. APPLEGATE: The determination or delineation, versus --

MS. CAHN: And if it is the area of review, the physical place, then call it area of review.

Page 24-34, line 32, you can just remove the word "of." So, "at least 60 days before plugging a well." Page 24-35, line 7, there's the area of review, so it would be the area of review -- I don't know if it's "and corrective action plan" or if it's delineation, but it's probably better just the delineation, the update.

Page 24-38, line 20, I think it should be "threaten," rather than "threatens," "that may cause an

endangerment to a USDW or threaten." Line 24, same page, that's your area of review again and corrective action.

MR. FREDERICK: I'm just going with delineation.

MS. CAHN: That's good with me. 24-39, line 17 -- no. Line 18. I would get rid of "completion of," and at the end of the comma, after "site closure plan," say "are completed." I'm not sure what --

CHAIRMAN WELLES: Say that again, please.

MS. CAHN: Get rid of "completion of" and put it after -- just before the comma, "and site closure plan," "are completed." I think it made it more clear. I'm not sure that works. I didn't understand the sentence. The administrator receives the well plugging report identified in Section 15(b) or the post-injection site care and site closure plan are completed -- the administrator receives -- or they receive the post-injection site care and site closure plan. Right? So maybe the word "completion" should come out of there, because they're not going to receive something, a plan, unless it's completed.

MR. FREDERICK: I think the intent here is to recognize that we want the ability to release financial assurance during different phases of the project. In other words, we're going to have financial

assurance on the well plugging, for instance. Once they complete that, then we want to be able to release that amount of bonding or surety that's associated with plug and abandonment of the wells but retain what's left or required for certain other things that need to be completed.

MS. CAHN: What was confusing was the word "completion," because you're saying the administrator receives the well plugging report, or what? They're not receiving completion.

MR. FREDERICK: Upon completion?

MS. CAHN: So they're receiving a site care and site closure plan upon completion. That's fine. But the administrator doesn't receive completion.

CHAIRMAN WELLES: Upon completion, then. Right?

MS. CAHN: Yeah. We could say or, comma, upon completion, comma, the post-injection site care and site closure plan. The administrator's receiving something. They're not receiving completion. It's like taking Communion or something.

CHAIRMAN WELLES: Let's not bring religion to this.

MR. FREDERICK: Well, it would probably read, "or upon completion of the post-injection site care

and site closure plan requirements."

MS. CAHN: I don't know what they're completing. Are they completing the plan or meeting their requirements?

MR. FREDERICK: Relief of financial responsibility.

MS. CAHN: And then it says, "Or the director authorizes site closure." I guess that's okay. But I just wasn't clear. I mean, what's the administrator receiving? I think they're receiving the post-injection site care and site closure plan.

MR. FREDERICK: If you read paragraph (a), the introduction, the owner or operator must demonstrate and maintain financial responsibility and resources for corrective action, injection well plugging, post-injection site care and site closure in a manner prescribed by the director until the wells have been plugged. In other words, he receives the well plugging report that describes how the wells are plugged, or upon completion of the post-injection site care and site closure plan --

MS. CAHN: Okay. So it's just completion of the plan. It's not that they're actually doing the work?

MR. FREDERICK: No. It's that they're

actually doing the work.

MS. CAHN: So it's on completion of the post-injection site care and site closure and not the plan?

MR. FREDERICK: Right. Not the plan.

CHAIRMAN WELLES: Take out the plan. Site closure requirements? You want to leave "requirements" in there? He added that. So it would read "and site closure requirements," period.

MS. CAHN: But the administrator can't receive -- okay. So receives the well plugging report or the post-injection and site care and site closure --

CHAIRMAN WELLES: Requirements.

MS. CAHN: -- requirements are met? Or the post-injection site care and site closure requirements are met as appropriate. So get rid of "completion."

MR. APPLEGATE: Wouldn't you have to have site closure? Why even use the words "post-injection"? As we just talked about, that comes before site closure. Site closure is post, is after post-injection activities.

MS. CAHN: See, that wasn't clear to me. What were they receiving? Are they receiving the plan, or is it the work that has to be done?

MR. FREDERICK: No. It's the work.

MS. CAHN: I think it's going to read, "The administrator receives the well plugging report identified in Section 15(b), or the post-injection site care and site closure requirements are met as appropriate, or the director authorizes site closure." Well, that doesn't make sense. It's got to be the plan, then, because then it's site closure at (ii). They meant the plan. So then the administrator receives the post-injection site care and the site closure plan, but it's --

MR. FREDERICK: I hate this EPA language. I just hate it.

CHAIRMAN WELLES: You also have a conflict where you changed -- up above there in line 14, you changed "administrator" to "director," and then in line 17, you go back to "administrator," and in line 20, you go back to "director." I'm not sure. Maybe it's supposed to be that way. But, to me, that seems a little odd.

MS. ANDERSON: The financial assurance is being required by the director. And then the other two paragraphs, it looks like are requirements for the director to waive that, or to release that financial assurance.

MR. FREDERICK: I'm not clear what we're

struggling with here, other than trying to establish whether we're talking about the site care and closure plan or the requirements.

MS. CAHN: I don't know.

MR. FREDERICK: Is that the only issue?

MS. CAHN: No. And the wording. Because administrator doesn't receive completion. So it's -- more important is understanding what it is that we -- the administrator is going to receive. And once we understand that, we can work on the English. There's two issues. One is an English issue, and one is what the heck are we requiring?

MR. FREDERICK: This may be actually an issue that we aren't going to be able to fully resolve.

MS. CAHN: Without talking to EPA.

MR. FREDERICK: Well, no, until we get the financial assurance rules established.

CHAIRMAN WELLES: That's what's now in front of the legislature.

MR. FREDERICK: Right. Right.

MS. CAHN: Can we make a stab from what is written above in (a), starting on line 10, what we think it means? So (a) is saying these are all the things that the owner or operator must demonstrate with financial responsibility. We've got -- and that includes injection

well plugging, post-injection site care and site closure.

MR. FREDERICK: And the intent of their language, I suspect, when they say completing the post-injection site care and site closure plan, the intent there is that they've met the requirements. In other words, they've actually completed what they said they would complete in the plan. It's clumsily stated. I'll grant you that. But that's the intent.

MS. CAHN: So then we can say -- get rid of "completion of" and say "or the post-injection site care and site closure requirements are met."

MR. FREDERICK: Right.

MS. CAHN: Or "plan." I mean, I don't think we need "plan" in there. "Requirements are met."

CHAIRMAN WELLES: Just, "site closure requirements are met," period.

MS. CAHN: "As appropriate."

CHAIRMAN WELLES: "As appropriate."

MS. CAHN: "Or the director authorizes site closure."

CHAIRMAN WELLES: Yeah.

MS. CAHN: And then I think we're good. Is everybody okay with that?

MR. FREDERICK: Did we strike "as appropriate"?

CHAIRMAN WELLES: No.

MS. CAHN: I didn't have a problem with "as appropriate" unless you do. I have a problem with "completion of." So we struck "completion of," and we struck "plan" and replaced "plan" with "requirements."

CHAIRMAN WELLES: You could probably strike "as appropriate," but it's probably okay to leave it in.

MS. CAHN: Ask the lawyer if "as appropriate" is appropriate.

MS. ANDERSON: Sure.

MS. CAHN: Guess what, guys? I'm done.

CHAIRMAN WELLES: Really?

MS. CAHN: I'm done with my comments.

CHAIRMAN WELLES: Could we take a two-minute break?

(Hearing proceedings recessed 1:41 p.m. to 2:16 p.m.)

CHAIRMAN WELLES: So we will reconvene the meeting of the Water and Waste Advisory Board, February 26th, at 2:15 p.m., for the purpose of a vote by the board members who are present -- and we do have a quorum -- concerning the revisions to water quality rules and regulations, Chapter 24.

MR. APPLEGATE: So I make a motion that we

approve the proposed rules with the revisions that we've discussed, to move them forward into the EQC.

MS. CAHN: I second.

CHAIRMAN WELLES: All those in favor.

(All members vote aye.)

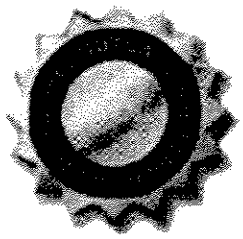
CHAIRMAN WELLES: Motion passes. Rule moves forward.

(Hearing proceedings concluded 2:17 p.m., February 26, 2010.)

C E R T I F I C A T E

I, RANDY A. HATLESTAD, a Registered Merit Reporter, do hereby certify that I reported by machine shorthand the proceedings contained herein constituting a full, true and correct transcript.

Dated this 18th day of March, 2010.



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