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STATE OF NEW MEXICO
ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:
Case No. 25875.

HEARING - DAY 4
DATE: Thursday, July 30, 2026
TIME: 9:00 a.m.
BEFORE: Hearing Examiner Felicia Orth
LOCATION: Wendell Chino Building
1220 South Saint Francis Drive
Pecos Hall
Santa Fe, NM 87505
REPORTED BY: Ryan Auten
JOB NO.: 8347078

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1 A P P E A R A N C E S (Cont'd)

2 ALSO PRESENT:

3 Albert C.S. Chang, Commission Chair (by
4 videoconference)

5 Dr. William Ampomah, Commissioner

6 Paige Czoski, Commissioner

7 Zachary Shandler, Commission Counsel

8 Sheila Apodaca, Commission Clerk

9 Dr. Gregory Schnarr, Principal Environmental
10 Scientist

11 Matt Eales, CoolSky Energy Solutions

12 Jennifer Raney, Deputy Director of PRRC

13 Katherine Walton, WELC

14 Elvis Leunguen, EMNRD (by videoconference)

15 Caroline Wachtman, Attendee (by videoconference)

16 Allison Marks, Attendee (by videoconference)

17 Peter Kondrat, EMNRD (by videoconference)

18 Robert Mathes, Attendee (by videoconference)

19 Tiffany Wallace, Attendee (by videoconference)

20 Heath Lovell, Attendee (by videoconference)

21 Gerasimos Razatos, EMNRD (by videoconference)

22 Erin Ramaker, Attendee (by videoconference)

23 Le Teaisha Carter, Attendee (by videoconference)

24 Rosa Romero, EMNRD (by videoconference)

25 Mike Eisenfeld, SJCA (by videoconference)

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A P P E A R A N C E S (Cont'd)

ALSO PRESENT:

Carl Chavez, EMNRD (by videoconference)
Peter Morgan, Attendee (by videoconference)
Mark Ballard, Attendee (by videoconference)
Benjamin Shelton, EMNRD (by videoconference)
Emmanuel Gyimah, Attendee (by videoconference)
Jordan Kessler, Attendee (by videoconference)
CH, Attendee (by videoconference)
Brittany Hall, EMNRD (by videoconference)

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I N D E X

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OPENING STATEMENT By Mr. Pavlik 792

WITNESS(ES): DX CX RDX RCX

CATHERINE HELM-CLARK, PH.D.

By Mr. Pavlik 804 895

By Mr. Tucker 870

By Mr. Tremaine 877

EXAMINATION PAGE

By Commissioner Ampomah 902

By Commissioner Czoski 963

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3	Case No. 25875:		
4	CBD:		
5	Exhibit 1	Proposed Changes to	
6		Applicant's Proposed 19.15.43	
7		NMAC (Redline)	807/809
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9		Catherine Helm-Clark, Ph.D.	805/809
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12	Exhibit 4	Oil Ejected to the Surface	
13		by Venting CO2	809/809
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15		from Identifiable Point	
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17	Exhibit 6	Hall Plot Figure from Ohio	
18		Department of Natural	
19		Resources (ODNR) Report on	
20		Redbird No. 4	809/809
21	Exhibit 7	Ambient Noise Tomography Image	
22		of the Helium Gas Resource in	
23		Northeast Minnesota	809/809
24	Exhibit 8	Weatherford International	
25		Slimline Acoustic Imaging Log	809/809

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P R O C E E D I N G S

THE HEARING EXAMINER: It's 9:00.
Let's begin this morning. We are on day 4 of the
hearing in OCC 25875 related to primacy for Class VI
wells. We've come to our fourth public comment
session. I don't see anyone in the room unaffiliated
with a party.

Sheila, is there anyone on the platform
who would like to offer non-technical public comment
this morning?

THE CLERK: There is nobody who has
signed up, but I don't see any hands raised.

THE HEARING EXAMINER: If you're on the
platform, and you'd like to offer non-technical public
comment, please raise your virtual hand or reach out
through the chat. Public comment is accepted at 9
a.m. on all days that we continue through this
hearing. The other possibility, which some folks have
done, is to submit written public comment through
Sheila Apodaca.

All right. Let's go back to the
technical case then this morning. Ms. O'Grady? Oh,
no. I'm sorry. Mr. Pavlik or Mr. Cox? You're
sitting in front of me, so --

Mr. Pavlik, are you on the platform?

1 MR. PAVLIK: Yes, I am. Good morning.
2 Thank you. I'll begin with my opening statement, and
3 then I'll call Dr. Helm-Clark to testify on behalf of
4 the Center Biological University.

5 THE HEARING EXAMINER: Thank you.

6 MR. PAVLIK: Good morning, Madam
7 Hearing Officer and Commissioners. My name is Zach
8 Pavlik, and I represent the Center of Biological
9 Diversity. I want to start by thanking you for your
10 significant engagement in the rule-making thus far and
11 all the important questions that you've asked. I'm
12 also grateful to the State's experts for the time
13 they've dedicated to this hearing these past few days.

14 I'm going to begin by renewing our
15 objection to the Commission's jurisdiction. Then I'll
16 explain our substantive case. In short, the
17 Division's proposal to largely adopt outdated federal
18 regulations is inadequate to protect underground
19 sources of drinking water in communities in New
20 Mexico.

21 I'll outline the evidence and arguments
22 that will be presented to the Commission for why and
23 how the rule must be made more protective.

24 To begin, I'd like to renew the Center
25 for Biological Diversity's objection that neither the

1 Commission nor the Division have the authority to
2 promulgate this proposed rule, especially with its
3 current scope.

4 We have discussed this in our motion to
5 dismiss and summarized our position at the beginning
6 of this hearing. In short, no statute gives either
7 body the authority to promulgate the extensive
8 language in the proposed rule.

9 The Oil and Gas Act pertains to matters
10 outside of the scope of this proposed rule. The
11 Stewardship Act only gives narrow authority to the
12 Division concerning issues related to ongoing Class VI
13 stewardship. The Commission's authority under the
14 Stewardship Act is limited to establishing a fee
15 structure for the Stewardship Conduct.

16 Despite this, the applicant has chosen
17 to proceed without waiting for the legislature to
18 grant it authority. In doing so, it has also invited
19 this Commission to act outside its authority. This is
20 but one manifestation of the rushed nature of this
21 rule-making. Others were identified in Commissioner
22 Czoski's motion yesterday.

23 Subject to these objections, we are
24 participating in this rule-making to highlight the
25 inadequacies of the federal regulations to protect New

1 Mexico's waters and people.

2 This in turn preserves all objections
3 raised in its motion to dismiss along with all related
4 bases for appeal of any rule promulgated, including
5 lack of authority to enact all or part of this rule.

6 And now I want to turn to the reasons
7 the Commission must promulgate a strong rule that does
8 more than simply adopt the federal regulatory
9 language. Through this rule-making, New Mexico seeks
10 primary enforcement authority over the permitting and
11 regulation of Class VI long-term CO2 injection laws.

12 This is a very technical program. And
13 as we have heard, there are still significant
14 outstanding questions and concerns. It requires
15 substantial experience and capacity to adequately
16 review project proposals and ultimately protect
17 underground sources of drinking water.

18 The program will expose New Mexico to
19 broaden financial liability because the state itself
20 will accept ongoing responsibility for all Class VI
21 wells in New Mexico. This could have huge impacts for
22 the state that is already struggling with liability in
23 the oil and gas context.

24 Class VI wells and infrastructure also
25 pose deadly risks to communities. Notably, these can

1 only be mitigated, not eliminated. The upshot is that
2 robust and protective regulatory language must be the
3 cornerstone of this rule. This rule must go further
4 than federal regulations.

5 As the Center's technical expert,
6 Dr. Catherine Helm-Clark, will testify, the current
7 federal framework is outdated. The Commission will
8 hear testimony from Dr. Helm-Clark as to some of the
9 inadequacies of the federal regulations.

10 The federal rule includes technical
11 requirements and methodologies that are no longer best
12 practice. The result is substantial risk, risk to
13 underground sources of drinking water and risk to
14 communities. The Commission must circumvent this risk
15 with a strong and modernized rule. Dr. Helm-Clark
16 will offer the Commission a suite of suggestions to
17 assist the Commission in filling the gaps in the
18 federal regime.

19 Importantly, the federal framework
20 serves as the floor for this rule. Federal rules
21 explicitly allow New Mexico to adopt more stringent
22 protections, and the Commission must do so. It must
23 do so to protect both New Mexico's underground sources
24 of drinking water and its communities.

25 I urge the Commission to reject a rule

1 that merely adopts the federal framework. I encourage
2 it to instead adopt the modern, scientifically backed
3 amendments offered by Dr. Helm-Clark to protect the
4 interest of the state, its resources, and its
5 residents.

6 I'd now like to outline a few of the
7 Center's proposed amendments. During this hearing,
8 you will hear testimony on behalf of the Center from
9 Dr. Helm-Clark.

10 Dr. Helm-Clark has a Ph.D. in geology.
11 She has extensive experience working on geotechnical
12 engineering and with industry on projects on Alaska's
13 North Slope, the Niger Delta, and the Great Basin.
14 Her recommendations strengthen the rule in important
15 ways while remaining reasonable. She has offered
16 measures informed by her industry background and her
17 experience reviewing Class VI permits.

18 The amendments she suggests can be put
19 into three general buckets. They include, one,
20 additional protective provisions for Class VI
21 projects; two, certain technical modifications; and,
22 three, strengthening the rules, justice, and
23 transparency for New Mexicans. All amendments respond
24 to glaring shortcomings in the current proposed rule.

25 First, beginning with protective

1 provisions, you'll hear Dr. Helm-Clark speak to
2 ensuring the safety of New Mexico's communities. This
3 should not be overlooked in protecting underground
4 sources of drinking water.

5 She recommends measures such as a
6 10-mile site characterization radius and half-mile
7 setbacks. These measures are related to the
8 protection of underground sources of drinking water.
9 They prioritize preventative and corrective action
10 based on risk to underground sources in drinking water
11 that overlap with risks to communities near Class VI
12 projects. They offer necessary protections for New
13 Mexicans under the Class VI framework.

14 You'll also hear Dr. Helm-Clark suggest
15 that adequate protection of underground sources of
16 drinking water in communities will not be possible
17 without accurate and comprehensive well
18 identification. This must happen within the area of
19 review and near certain public and residential zoned
20 areas.

21 Dr. Helm-Clark notes that the
22 monitoring of the injection zone through timely and
23 responsive reevaluations of the area of review is
24 vital for risk reduction.

25 Second, moving to technical provisions,

1 the Commission can expect to hear testimony from
2 Dr. Helm-Clark recommending regulatory tools to
3 provide OCD with necessary data, data to allow to
4 effectively monitor Class VI injection operations.
5 Those tools are based on science and her firsthand
6 experience in the industry.

7 Dr. Helm-Clark suggests monitoring
8 tools and methods that are already familiar in the
9 industry. These recommendations are tailored to
10 maximize the Division's access to information without
11 being technically or economically prohibited.

12 For example, her suggestions include
13 utilizing Hall lots in performing additional logging
14 that are known and accessible industry tools. All
15 data will be reported to the Division to leverage its
16 decision-making.

17 Third, the Commission will hear
18 proposed amendments to strengthen transparency and
19 ensure communities have the capacity to respond to the
20 catastrophic emergencies that can result from Class VI
21 projects.

22 Dr. Helm-Clark has requested executive
23 summaries of the reasoning behind their review
24 delineation methodology. This would allow interested
25 parties and notably the Division itself to save

1 significant time and resources reviewing an
2 application and determining the appropriateness of an
3 area of review.

4 Dr. Helm-Clark notes that emergency
5 situations caused by Class VI projects can be deadly.
6 She underscores the importance for communities to have
7 the capacity to respond to these emergency situations.
8 She suggests a solution.

9 Class VI project components should
10 provide specific minimum training elements that
11 involve minimal investment but supply maximum
12 protection for communities at risk with these
13 projects. Those should be set by OCD.

14 The minimums proposed by Dr. Helm-Clark
15 present this Commission with straightforward,
16 science-backed, and reasonable pathways for a more
17 protective rule.

18 Lastly, I want to discuss the
19 implications of this rule-making for New Mexico. The
20 Commission is laying groundwork for a new industry in
21 the state. That industry comes with many unique and
22 considerable risks.

23 The growing abandoned oil crisis in the
24 oil and gas space teaches us that meaningful
25 regulation and enforcement are vital. This is the

1 only way to protect public interest. And the Class VI
2 industry presents potentially far greater risks on a
3 per-project basis than oil and gas wells.

4 This rule-making is a chance for the
5 Commission to leverage these lessons learned. The
6 Commission can promulgate a rule that avoids the
7 pitfalls of other programs. It would be a mistake to
8 begin from a point of under-regulation. Instead, we
9 urge the Commission to adopt proactive and
10 precautionary approach.

11 We urge you to hold all Class VI
12 operators to the highest standard. This standard
13 should have meaningful protection as its foundation.
14 The Commission should avoid setting a bar that is too
15 low by merely adopting the federal floor.

16 It should avoid hastening to pass a
17 weak or incomplete rule. Doing so will result in New
18 Mexico assuming unnecessary risk. It will also
19 require future rule-makings to address shortcomings
20 that we've already identified and know are present in
21 today's rule.

22 In conclusion, the Center participates
23 in this rule-making without waiving its objections to
24 the Commission or Division authority that are outlined
25 in its motion to dismiss.

1 The Class VI program is a complex
2 technical program that has potentially irreversible
3 consequences if not administered properly. These
4 consequences are both on underground sources of
5 drinking water in New Mexico's communities. The
6 program must be properly administered and guided by
7 strong regulation.

8 The rule the Commission adopts must be
9 protected, one that mitigates the risks that cannot be
10 eliminated. This rule must be more stringent than the
11 aging and inadequate federal regulations that the
12 Division's proposal largely adopts thus far.

13 I urge the Commission to critically
14 examine each of the suggested amendments during this
15 hearing using a straightforward lens. I invite you to
16 compare the alleged cost of each amendment, whether
17 that be to industry or the Division, to the real
18 benefit it would have for New Mexicans.

19 At the end of the day, I believe the
20 path forward will be clear. The Commission must make
21 an assertive and protective approach in this
22 rule- making its foundation. It must protect New
23 Mexicans and their water above simple industry
24 preference or administrative convenience. Thank you.

25 THE HEARING EXAMINER: Thank you,

1 Mr. Pavlik.

2 MR. PAVLIK: Thank you. And I would
3 now like to call Dr. Catherine Helm-Clark forward. I
4 believe she's on the platform.

5 Dr. Helm-Clark, are you there on the
6 platform?

7 THE HEARING EXAMINER: I believe she
8 can unmute herself if she's there.

9 DR. HELM-CLARK: Can you hear me now?

10 THE HEARING EXAMINER: Yes.

11 MR. PAVLIK: Oh, yes. We can.

12 DR. HELM-CLARK: And I don't know why
13 my camera's not on. Come on, camera. Turn on. My
14 camera's on from my end.

15 THE HEARING EXAMINER: Sheila?

16 THE CLERK: She has full presenter
17 permissions on our end.

18 THE HEARING EXAMINER: All right. She
19 has permissions, Mr. Pavlik.

20 MR. PAVLIK: Okay. Let's see here.
21 Dr. Helm-Clark, are there any possible -- is there
22 anything obstructing your camera's view by any chance?
23 I don't know if there are any sliders or anything.

24 DR. HELM-CLARK: No. Actually, in --
25 in the preview, I can see myself just fine. More

1 video settings, webcam.

2 MR. PAVLIK: Another thing sometimes I
3 know in the past it's helped to briefly log off and
4 then rejoin the meeting. If the settings aren't
5 behaving, that might help. You could try that.

6 DR. HELM-CLARK: Well, I had to do that
7 yesterday, so I already know that I've been struggling
8 with this. Let me log off and come back right on.

9 THE HEARING EXAMINER: Sheila, while
10 we're waiting, is Chair Chang on the platform?

11 THE CLERK: Yes, he is.

12 THE HEARING EXAMINER: Okay. I meant
13 to make note of that earlier.

14 Thank you, Commissioner Ampomah.

15 THE CHAIR: Yes. I'm available on the
16 platform. And are people hearing me all right if I
17 need to chime in?

18 MR. PAVLIK: Yes.

19 THE CHAIR: All right. Thank you.

20 DR. HELM-CLARK: There.

21 MR. PAVLIK: Oh, perfect.

22 DR. HELM-CLARK: That work?

23 MR. PAVLIK: Yes. I can see you. Can
24 the commissioners also see Dr. Helm-Clark?

25 THE HEARING EXAMINER: Yes. Thank you

1 very much, Mr. Pavlik.

2 Dr. Helm-Clark, would you spell your
3 first and last names, please?

4 DR. HELM-CLARK: My first name is
5 Catherine, C-A-T-H-E-R-I-N-E. The last name is
6 Helm-Clark. That's a hyphenated in the last name.
7 H-E-L-M, hyphen, C-L-A-R-K.

8 WHEREUPON,

9 CATHERINE HELM-CLARK, PH.D.
10 called as a witness and having been first duly sworn
11 to tell the truth, the whole truth, and nothing but
12 the truth, was examined and testified as follows:

13 THE HEARING EXAMINER: Thank you very
14 much.

15 Go ahead, Mr. Pavlik.

16 MR. PAVLIK: Thank you.

17 DIRECT EXAMINATION

18 BY MR. PAVLIK:

19 MR. PAVLIK: Good morning,
20 Dr. Helm-Clark. Just going to begin with some
21 preliminary questions that we kind of need to ask to
22 begin this process, and then we'll go into the summary
23 of your direct testimony. Have you previously
24 provided testimony before this Commission?

25 DR. HELM-CLARK: I have not.

1 MR. PAVLIK: And did you supply a copy
2 of your curriculum vitae for this hearing?

3 DR. HELM-CLARK: I did.

4 MR. PAVLIK: I'm going to share my
5 screen here. Sorry -- let me just zoom out here.
6 Okay. Okay. I'm sharing CBD Exhibit 2. Are you able
7 to see that?

8 (CBD Exhibit 2 was marked for
9 identification.)

10 DR. HELM-CLARK: Yes.

11 MR. PAVLIK: Is this a true and
12 accurate copy of your curriculum vitae to the best of
13 your knowledge?

14 DR. HELM-CLARK: Yes.

15 MR. PAVLIK: Thank you. Can you
16 briefly describe your relevant educational and
17 professional background regarding Class VI wells in
18 this ruling?

19 DR. HELM-CLARK: My educational
20 background, I have a B.A. from Northwestern University
21 in geological science. I have a M.S. from Caltech in
22 geophysics. I have a Ph.D. in geology from the
23 University of California at Davis.

24 In terms of working in the oil patch,
25 my -- my first experience working in the industry was

1 as a landman, working in -- in -- for -- for
2 wildcatters in -- in New York State and Pennsylvania.

3 After that, I've --- I -- I need to
4 look at my notes real quick. I've -- I've worked for
5 Schlumberger writing proprietary well-logging
6 software. And I've worked as a well log analyst in --
7 in doing fracture analysis, porosity analysis,
8 reservoir analysis at Rozel Point, also in North Slope
9 Alaska, in Niger Delta, Cameroon.

10 I've done work characterization and
11 fracture analysis in -- in -- on -- on the Gulf
12 Course -- Coast. And also, you can easily label me as
13 a Great Basin geologist as I've done a lot of geology
14 there.

15 So with respect -- oh, and -- and on
16 top of that, I've -- I've been -- I've been consulting
17 and doing permit review analysis for the last several
18 year -- for the last couple of years but with Class VI
19 wells, also Class I and Class II.

20 MR. PAVLIK: Okay. Thank you very
21 much. Appreciate it. And have you been involved in
22 Class VI permitting review in any other state or
23 federal jurisdiction?

24 DR. HELM-CLARK: I've done most of
25 my -- well, my -- my Class VI permit reviews have all

1 been in Louisiana to date.

2 MR. PAVLIK: Okay. Thank you. Okay.
3 I'm sharing what's marked as CBD Exhibit 1 on the
4 screen here. These are the -- it's titled Proposed
5 Changes to Applicant's Proposed 19.15.43 NMAC Redline.
6 Are your proposed amendments to the rule reflected in
7 this document to the best of your knowledge?

8 (CBD Exhibit 1 was marked for
9 identification.)

10 DR. HELM-CLARK: They are.

11 MR. PAVLIK: CBD Counsel has added this
12 definition for Division along with some small spelling
13 and formatting corrections. But other than that, are
14 all of the redline changes in this document true and
15 accurate representations of your suggested amendments
16 to the rule, to the best of your knowledge?

17 DR. HELM-CLARK: They are.

18 MR. PAVLIK: And did you prepare direct
19 testimony for this rule-making?

20 DR. HELM-CLARK: I did.

21 MR. PAVLIK: This is CBD Exhibit 3,
22 marked CBD Exhibit 3, Direct Testimony of
23 Dr. Catherine Helm-Clark, Ph.D. Is this a full and
24 correct copy of your testimony?

25 //

1 (CBD Exhibit 3 was marked for
2 identification.)

3 DR. HELM-CLARK: Yes.

4 MR. PAVLIK: And are there any changes
5 you'd like to make to it at this time?

6 DR. HELM-CLARK: There are not.

7 MR. PAVLIK: Are you prepared to adopt
8 this testimony as your sworn testimony today?

9 DR. HELM-CLARK: That is correct.

10 MR. PAVLIK: Also, in your testimony,
11 there are five exhibits that you have included in
12 text. These are Exhibits 4, 3. I'm going to briefly
13 hold each of those exhibits up on screen and then ask
14 you a few questions about them collectively.

15 Okay. So this is marked Exhibit 4, CBD
16 Exhibit 4, Oil Ejected to the Surface by Venting CO2.
17 Here is Exhibit 5, Selected Events at a Distance from
18 Identifiable Point Source Injection Well Sites. It's
19 a table. Exhibit 6, Hall Plot Figure from Ohio
20 Department of Natural Resources, Redbird No. 4.
21 Exhibit 7, Ambient Noise Tomography Image of the
22 Helium Gas Resource in Northeast Minnesota. And
23 finally, Exhibit 8, Weatherford International Slimline
24 Acoustic Imaging Log.

25 Do these exhibits all relate to your

1 testimony and your suggested amendments to the
2 proposed rule?

3 (CBD Exhibit 4 through CBD Exhibit 8
4 were marked for identification.)

5 DR. HELM-CLARK: They do.

6 MR. PAVLIK: And do you have
7 professional knowledge as to the subject matter of
8 each exhibit?

9 DR. HELM-CLARK: Yes.

10 MR. PAVLIK: Were these exhibits chosen
11 by you to illustrate the points that you make in your
12 testimony?

13 DR. HELM-CLARK: They were.

14 MR. PAVLIK: And are these exhibits
15 true and accurate copies of the underlying materials
16 to the best of your knowledge?

17 DR. HELM-CLARK: Yes.

18 MR. PAVLIK: Madam Hearing Officer, I
19 move to enter Exhibits 1 through 8, CBD Exhibits 1
20 through 8.

21 THE HEARING EXAMINER: I'll pause for a
22 moment in the event there are objections from other
23 parties. Exhibits 1 through 8 are admitted.

24 (CBC Exhibits 1 through 8 were received
25 into evidence.)

1 MR. PAVLIK: Thank you.

2 And do you have the demonstrative
3 PowerPoint, Dr. Helm-Clark-Clark, for summary of your
4 direct testimony today?

5 DR. HELM-CLARK: Yes.

6 MR. PAVLIK: I'm going to share my
7 screen once more. Let's continue with the summary of
8 your direct testimony. Is this the PowerPoint that
9 you created to summarize your testimony?

10 DR. HELM-CLARK: Yes, it is.

11 MR. PAVLIK: Okay. Great. So we will
12 begin. We'll go through this. I'm happy to move
13 through the slides to progress the slides for you.
14 And we'll need to keep this to one hour. Start the
15 slideshow. Let's use this -- okay. To begin, can you
16 please briefly explain what your testimony is based
17 upon and your approach to researching it?

18 DR. HELM-CLARK: All right. My
19 testimony is built on three legs. The first is my
20 personal experience working in geoscience overall.
21 And I need to insert here that that -- that as well as
22 working in the oil patch, I have significant CERCLA
23 and RCRA experience.

24 I've been the field manager for a
25 Superfund site. I have been OSHA HAZWOPER certified

1 for over 40 years. I was one of the first people in
2 the United States to get the certification. And my --
3 my regulatory compliance and -- and environmental
4 experience is -- is as significant as my oil patch
5 significant and -- my oil patch experience. And I do
6 draw in some of this into that experience. It did
7 inform a lot of my commentary.

8 The -- the second leg is my experience
9 in permit review. I've been through many permits now,
10 and I've formed some definite opinions about the
11 permit process, the regulations, and what I think
12 should be in permits as opposed to what I'm seeing in
13 permits that I review.

14 And the last is basically peer review
15 quality research, which is to say when I -- when I
16 have questions or when I feel that I have a lack of my
17 own knowledge, I definitely go out, and I research
18 deeply to answer the questions that I have and which I
19 feel other people have.

20 My research approach basically was --
21 was I -- I was using two different points of view, the
22 first of which is, as a permit reviewer, what would,
23 you know, what do I like to see in permits? What do I
24 think are missing in permits? And -- and I used that
25 knowledge in my commentary.

1 And the second is, I kept asking
2 myself, and -- and you have to ask this question, do
3 these regulations actually protect what they should be
4 protecting, which is to say underground sources of
5 drinking water and the communities that are going to
6 be near these Class VI projects. And that health and
7 safety of those communities has definitely been in the
8 forefront of my mind. Next slide.

9 You're going to see -- you're going to
10 see -- yeah. You're going to see three of these
11 slides. These -- these -- they're -- they're -- I --
12 I have I -- have three broad categories in my
13 presentation, the first of which is I make two
14 procedure -- recommendations for two procedural
15 changes.

16 The second of which is that in this
17 demonstration, I discussed seven additions to the
18 proposed rule. And the last section is I -- I
19 recommend or I highlight four changes I recommend to
20 the proposed rule.

21 The first part is just two procedural
22 changes. And these are an executive summary -- to
23 include an executive summary in the permit application
24 that discusses how the modeling is done. And I
25 recommend that you change how -- or -- or you make an

1 addition to how you do your review of wells within an
2 AOR and around sensitive areas like schools and
3 residential units. Next slide, please.

4 The executive summary in AOR modeling,
5 and this is -- this comes straight out of reviewing
6 permits. And every permit I've seen, regardless if
7 it's Class I or Class II or Class VI, what you get,
8 what happens is that the -- the folks who are
9 compiling these permits, especially with the -- with
10 the Class VI, there's -- there's a -- there's a table,
11 and I forget which -- which one of the 14 different
12 EPA guidance documents this is in.

13 But there's a table that everybody
14 uses, and they just go through the table and click off
15 the things that the EPA wants in those permits. Or in
16 the case of Louisiana or other states that have cut
17 and pasted the federal regulations as the basis for
18 their regulations, they have, you know, it -- it -- an
19 equivalent. Everybody is using the same table of
20 things that the EPA wants to put into the permit, and
21 they all follow it.

22 What -- what this -- so you end up
23 getting -- you end up getting a document that's got
24 all of the pieces that are required in a permit, but
25 we end up usually with a narrative that is

1 disorganized and hard to follow. And the place where
2 it's really hard to follow is trying to get from the
3 first data collection to what goes into that model.

4 Now, the models are always black boxes.
5 And as a reviewer, what I'm looking at is I want to
6 determine whether or not the data and -- and the
7 information they've collected is adequate to actually
8 do the job inside of the model.

9 Therefore, what I want, you know, and
10 what I'm looking for is I'm testing whether or not
11 this model is garbage in, garbage out. Because in
12 general, these software packages are very robust.
13 They're based on physics. They're very well written.
14 The big commercial packages do great jobs.

15 So what you're -- what you're looking
16 at as a permit reviewer is you're looking at the
17 soundness of the data going into that model and
18 whether or not they collected the right data in the
19 right way and they're using it correctly.

20 This is what's missing from permit
21 applications, is a road map from the first data
22 collection point to what's coming out of the AOR
23 model.

24 Now, there is in the AOR, corrective
25 AOR and corrective action guidance document, there's a

1 table. It's Table 2-1. It actually lists what I'm
2 talking about here. And if I were -- if I had this
3 requirement that I'm suggesting, if I were writing a
4 permit, what I would do is I'd go straight to that
5 table, and I'd use it as the basis for providing a
6 quick summary of what the data is, how it's getting
7 used, and how it reflects to the model.

8 And -- and it'd be simple. It'd take
9 probably, if I were doing this myself, and I had all
10 of the data at my fingertips, I would say no more than
11 two days to make a comprehensive table and in a couple
12 of paragraphs to say, here's the road map. This is
13 how we did it. So that -- that overview look is
14 what's missing.

15 Will permits die and the world end if
16 this is not in permit? Of course not. We're already
17 evaluating permits without this information. But what
18 it would do is it would save many, many hours of -- of
19 people who will have to read these permits in trying
20 to figure out how the permittee went from -- from
21 point A to point B. That's what's missing. That's
22 what I'm requesting. Next slide, please.

23 Two-stage well investigation. What's
24 happening right now when I -- when -- in -- in permit
25 reviews is that a lot of folks, they just pull up

1 the -- well, I should say the worst of the permit
2 applications, they -- they pull up the state's oil and
3 gas and water well databases, and they make a list.
4 And then they submit that. And then they're done.
5 That's the worst of them.

6 The best of them go out. They knock on
7 doors. They talk to old -- they talk to drilling
8 companies. They talk to regulators. They talk to
9 towns. They knock on door -- they talk to landowners.
10 And the best permit that -- that I think I have
11 reviewed, after they did all of that ground search
12 to -- to find potentially undocumented wells in their
13 AOR, they flew an aeromagnetic survey. And they
14 didn't do it just on top of the AOR.

15 They actually flew in several -- they
16 actually -- they actually -- I think they had a
17 five-mile radius. This is a very, very impressive
18 survey. And -- and -- I'll -- I'll say that, you
19 know, they -- I'm saying they went above and beyond.
20 The reason they went above and beyond in this case is
21 that they're proposing to put in four -- four
22 injection wells. So they just did all of their big
23 geophysics at once.

24 But they went -- they -- they did the
25 extra step. They flew the aeromagnetic survey looking

1 for wells. Now, what I'm suggesting is a two-stage
2 investigation. And if you think about it, this is
3 just common sense, but it also reflects what the EPA
4 is already doing in CERCLA and RCRA investigations.

5 And the -- the two-stage, you know,
6 documentation and then physical on-the-ground, if
7 necessary, geophysical investigation. This -- this
8 two-step process has become so standard that it's now
9 an ASTM standard.

10 So it's a common engineering practice.
11 People are doing this. The reason I'm recommending it
12 is that it works very well. And in one instance, I
13 can think of one instance in Ohio, and I mentioned
14 this incidence. It's the -- the Redbird No. 4
15 injection well happening.

16 If -- if the, you know, if Redbird 4
17 hadn't been -- had been a Class VI project, and they
18 were following a two-stage investigation, as I'm
19 recommending here, they would've gone out. They
20 would've knocked on doors and interviewed, you know,
21 landowners in the vicinity of -- of where -- where the
22 project was -- was recommended because this would've
23 been, I believe, within the AOR or just outside of it.

24 The -- the -- within a year of
25 injections starting, an abandoned well, which was --

1 which was now underwater because they filled in a
2 reservoir and covered over this well. They would've
3 interviewed the landowner of the -- the landowner that
4 formerly owned that property because it was still
5 adjacent to the state park that now includes it.

6 And they would've -- they would've
7 heard that their grandfather had brought in drillers
8 and drilled a whole bunch of oil wells on their family
9 farm. And they were never documented. And then they
10 were abandoned, and they were never plugged.

11 And this unplugged, abandoned,
12 undocumented well began discharging injectate into a
13 tributary to Lake Veto, which is a lake and a state
14 park in Ohio. If they had done a two-stage
15 investigation, like my recommendation, chances are
16 they would've known about these wells and would have
17 known to be looking for them and to correct them prior
18 to the injection project, if this had been a Class VI
19 project.

20 This is why I recommend two-stage --
21 two-stage investigations. They're an industry
22 standard, and they were. Next -- next slide.

23 MR. PAVLIK: And just a quick time
24 reminder. I just wanted to give you a heads-up that
25 you have roughly 45 minutes left.

1 DR. HELM-CLARK: Thank you. My
2 highlights -- my -- my -- these are -- these are
3 things that I am recommending you add to the rule.
4 It's -- I'm -- I'm -- I -- I believe I have more than
5 seven, but for the sake of remedy, we're best dealing
6 with seven. Next slide.

7 In reviewing permits, I've noticed that
8 in the remedial action -- in the remedial action
9 response plans for Class VI, when I -- when I look at
10 this section in permits, everybody is putting in a
11 nice little list. And the lists vary. They have I --
12 I know I've seen one that had 12 items.

13 I'm recommending a minimum of five
14 items for this. What the EPA wants is actually three
15 items. We'll visit that in a second. But the reason
16 I'm asking for this is because everybody's already
17 doing it. This -- this tells me that the EPA is
18 looking for this information. If -- if a detailed
19 list isn't in that remedial response plan, they're
20 going to be sending out a request for more
21 information.

22 The permitting's got to, you know,
23 spend an extra month or two months to -- to cough it
24 back up to the EPA, which, of course, creates another
25 delay. So in my mind, this is saying the EPA is

1 looking at this information. It's in every permit
2 that I've been looking at. Therefore, if the EPA is
3 requiring -- requiring, it's a requirement. If it's a
4 requirement, it should be in the rule.

5 Therefore, I'm suggesting it needs to
6 be in the rule. Everybody's already doing it. I
7 would expect that New Mexico would be requiring this
8 also. Why did I want a specific list? Well, I went
9 through. I identified everything that everybody is
10 including within the lists that comment, and I looked
11 at what the EPA is asking for. Let's go to the next
12 slide.

13 This is what the EPA wants. This is
14 this is quote. They're looking for significant
15 changes in site -- site operations, changes in the
16 monitoring results, or anything else that -- that
17 might, you know, be sufficient to trigger an -- a
18 reevaluation of the AOR.

19 Two seconds. I need to get my -- my
20 brain retooled here. The -- I -- I -- my -- my list
21 of five things, I -- I broke -- I -- I broke one thing
22 out. I -- I made it into two. And I added a -- a
23 fifth item, which is -- where I put in a line about
24 seismic activity, which is to say, if you've got
25 enough seismic activity of a sufficient magnitude, you

1 should stop and -- and reevaluate your AOR real quick
2 because you could have changed the conditions.

3 That is my only difference above and
4 beyond this quick list that EPA provides what they're
5 looking for. And so I -- I've gone -- I've expanded
6 from this simple three to a simple five. It's
7 certainly not as long as some of the lists that I've
8 seen in permits.

9 Now, if we're talking about AOR
10 reevaluation, AOR reevaluation has already -- has
11 already, you know, Class VI is very young relatively
12 in the UIC Programs. We have basically ten years'
13 experience, and that's not a lot because there just
14 haven't been a lot of permitted wells yet. And there
15 have been a lot of stumbling, you know, a lot of
16 little stumbles in the first couple of years, as we
17 all know.

18 We have already hit our first, that I
19 know of, AOR reevaluation that happened in 2020 at
20 Archer Daniels Midland at the Decatur CO2
21 Sequestration Project. They're -- they -- they had
22 anomalous pressure readings in one of their monitoring
23 wells that was significantly deviated from what they
24 were expecting, that they triggered the reevaluation
25 of the AOR.

1 That reevaluation of the AOR was kind
2 of startled because it showed that the pressure front
3 was growing much larger and much faster than the model
4 predicted. And they had to -- they had to revise
5 their AOR because of this. And they did so.

6 Just to tell you how much that model
7 was -- was off base, the pressure front that they --
8 that -- that they -- when they recalculated the
9 pressure front, they -- they determined that that --
10 it was 160 percent larger than predicted for the time
11 that -- that they made the measurement. That's
12 actually quite a significant difference in the model.
13 So next slide.

14 This is the one where I thoroughly
15 expect to be explored in -- in cross-examination.
16 I've examined it -- I've -- I've suggested an
17 additional 10-mile radius characterization zone. In
18 looking at permits and in looking what's happened
19 with -- with injection wells and UIC in general, there
20 is a class of accident that is not being addressed.

21 Now, when we started -- when we started
22 Class VI, the EPA decided that the primary risk of
23 Class VI wells was -- was mostly to sources of
24 drinking water. As we have gained more experience
25 with injection wells, this actually turns out not to

1 be the case.

2 We have more things to worry about than
3 just drinking water. We have, of course, induced
4 seismicity. And we have the -- the danger of surface
5 release. And you're going to -- I -- I know -- I -- I
6 know that there's been a lot of commentary in -- in
7 the rebuttal documents that -- that the -- the
8 focus -- the focus of the regulations should be
9 towards drinking water. That's our core, you know,
10 that's the core objective.

11 That -- that -- I -- I will -- I -- I
12 have reasons to disagree with this. And they are --
13 they are both reasons that are based in the rule and
14 reasons that are based in common sense. If you're not
15 protecting communities, we've got a problem.

16 The class of accidents that I see is --
17 that's not addressed by a simple AOR determination, is
18 we are propagating injectate fluids and -- and
19 associated formation fluids along transmissive faults,
20 large distances out of AORs to where they're doing
21 damage miles away from AORs.

22 This has -- this has been --
23 everyone -- everyone knows that this is happening with
24 induced seismicity. This is also happening with
25 fluids being injected to the surface. The pathway is

1 transmissive faults many miles out of a AOR. And then
2 that transmissive fault, either it induces seismicity
3 or it finds an abandoned or -- or a poorly plugged
4 well, and -- and it sends injectate to the surface.

5 And if it's sending injectate to the
6 surface, it -- on its way, it's passing certainly
7 USDWs. It's also passing layers that could be
8 producing oil and gas layers. And we have seen
9 accidents like this. Well, we've seen them in Ohio
10 copiously. We've also seen them in the Permian Basin.
11 Now, and -- and we see them not only in the United
12 States. We see them all over the world. Could you
13 please give me the next slide?

14 This is one of my exhibits. This is a
15 table that I threw together. It is not -- it's not a
16 comprehensive table. I -- I -- but it -- it is a
17 demonstrative of what I'm talking about. This is a
18 list of events that have happened miles outside of any
19 AORs.

20 Now, of course, in the case of
21 international projects, they're not doing AORs. But
22 the point is -- is that, third column in, how far
23 these incidences occurred. And you'll note that in
24 the table, the furthest is 20 miles. Most of them are
25 under ten.

1 If you -- if -- if you -- if you take
2 the mean, the -- the mean, and -- and I will not argue
3 and I will not state that this is a representative
4 table of all incidences because that would take a lot
5 more time than -- than, you know, that -- that's a
6 research project for a graduate student.

7 The -- but -- but if you look at my
8 table real quick, and you take an average, it's 8
9 miles. Why did I choose -- why did I choose 10 miles?
10 Well, there's, first off, simply it -- it's an eyeball
11 number. It's half the distance of the farthest
12 events.

13 And I thought to myself, you know, if
14 we were looking for faults within a -- a 20-mile
15 radius, that's ridiculous. Nobody's going to do it.
16 It'd be prohibitively expensive.

17 I thought, what's a reasonable
18 distance? The half would be -- half would be
19 reasonable. You could -- you could probably run
20 seismic or -- or buy seismic data that cover most of
21 the area you're looking at.

22 What you're looking for is you're
23 trying to identify these unmapped, unknown,
24 undocumented faults that seem to be at fault for these
25 incidences, coupled with, you know, well fields where

1 you've got improperly plugged wells or abandoned wells
2 or whatever. You know, it's -- it's a two-part
3 problem. Transmissive faults to wells.

4 My approach to my -- I asked myself
5 seriously, how do we stop this? How do we stop this?
6 We look for those. We look for the faults. We try to
7 identify these things and -- and avoid those sites
8 where we find these undocumented faults.

9 You can't look just up. You've got to
10 look down. You've got to have a confining layer
11 underneath your injection layer because, especially if
12 the induced seismicity, it's going down. And very
13 often it's finding faults in the crystalline basement.

14 So that's my -- that's -- that's the --
15 just recap to facts, that's my thoughts. We have this
16 class of accidents that we see happening now that the
17 EPA was not aware of back in the 2005, when they
18 started putting these regulations together, that this
19 was going to turn into a major problem.

20 But now we know that it's a problem.
21 It's faults to wells. My 10-mile approach is to
22 basically, you know, we're looking for two things
23 here. We're looking for the wells that -- that can
24 provide pathways to USDWs on the surface. And we're
25 looking for the faults that can feed those wells. And

1 we want to shut that down.

2 And that's why I suggested that we have
3 an additional characterization zone where we
4 specifically are trying to identify these transmissive
5 faults that are responsible for the incidences that --
6 like the ones I put in my table. Next slide.

7 This is the other half of that, where
8 I've suggested -- where we -- we make a zone where we
9 specifically go fault hunting. The second part of
10 this is that we want to make -- we want to ensure that
11 our public facilities are protected from this class of
12 accidents that we now know tend to do damage in UIC
13 programs.

14 And I simply have -- and -- and when I
15 asked myself, you know, we can't -- we can't -- trying
16 to go out and find every single well that's in a
17 10-mile radius would be ridiculous. I have personally
18 gone and found every single well, say, within a 2-mile
19 radius of -- of a permit well, and it took me four
20 weeks. It -- it just -- it's a huge amount of work.
21 It's cost prohibitive. It would be terrible. You
22 can't do it.

23 People would voluntarily not do carbon
24 sequestration if this was a requirement. So what's a
25 reasonable requirement? You want to armor schools,

1 hospitals, fire halls, city halls, and -- and
2 densely -- and dense residential neighborhoods from
3 Class VI activities.

4 So what I did is that I went to the
5 Emergency Response Guidebook, which is the standard
6 reference document for responding to hazardous
7 materials, accidents in the United States, Mexico, and
8 Canada.

9 And I looked up what the evacuation and
10 isolation zone would be for a catastrophic CO₂
11 release. And the answer is a half mile, or 800
12 meters. They -- they define it both ways because this
13 is an international document. The -- so I made that
14 my buffer zone because that is, in the event of an
15 accident, what the authorities are going to do.

16 They're going to create a half-mile
17 isolation or evacuation zone around a large release.
18 So that became my protection zone around hospital,
19 school, other public buildings, and densely -- densely
20 populated neighborhoods. And why, you know, and --
21 and would this work? Well, let's go to the next
22 slide.

23 This is the -- this is the Midwest
24 Wyoming Public School. It's K through 12. And what
25 you see in the foreground is an abandoned oil well.

1 That is quite literally in the backyard playground of
2 the elementary school portion of the school.

3 This well was determined in 2016 to
4 have -- to be responsible for the flooding of this
5 school with -- with IDLH, that's immediately dangerous
6 to life and health, quantities of CO2 and benzene.

7 This is a leaking underground well.
8 The -- the -- this -- this well was drilled in the
9 1930s. I believe it was plugged in the 1950s. Yes,
10 it was a plugged well. The school was -- the -- the
11 school was closed in May, I believe, of 2016. It did
12 not reopen until the -- the 2018-19 school year.

13 They had to bus the kids in Midwest
14 Wyoming to a school in Casper, 40 miles away. They
15 had to evacuate the neighborhood next door to the
16 school. This is -- this is the poster child for how
17 bad things can go wrong with CO2.

18 Why would I say CO2? Because this area
19 was one of -- this area was a CO2 EOR injection site.
20 They were injecting into the Salt Creek Reservoir CO2.
21 Anadarko started the project, I believe, in around
22 2010. They sold it to a company named Fleur-de-Lis,
23 who was the operator at the time of this accident.

24 This is what -- this is -- this -- this
25 accident was what was in the forefront of my mind when

1 addressing -- when -- when coming up with this -- with
2 this fault characterization plus half-mile well
3 examination around public buildings speed. Next
4 slide.

5 MR. PAVLIK: Just a quick time update.
6 About 30 minutes left.

7 DR. HELM-CLARK: Got it. Keep going.
8 That's -- you need to go back one. This is simple.
9 I've recommended a five-day ramp up, a minimum
10 five-day ramp up period at the initiation of pumping.
11 The reason I'm -- the reason I suggest this is that
12 I'm seeing it in all the -- I'm seeing it in the
13 permits that I'm reviewing.

14 If I'm seeing it in every permit, it
15 means the EPA is expecting them to see it. That makes
16 it, in my mind, something the EPA is requiring or
17 expecting to see. If -- if it's in there all of the
18 time, it ought to be a requirement. Mandated. Put it
19 in. That's my suggestion. Next slide.

20 I suggested -- I've suggested
21 additional well logs. When you go to -- hold on. I
22 need to look at my other computer screen. Well, not
23 look at my other computer screen. We go to -- in the
24 proposed rule, go to 19.15.43.9.H. I am referring to
25 that because just to give you the number if you want

1 to go and look at it. It is the well logging
2 requirements.

3 Those well logging requirements
4 stipulate one set of logs before you set the surface
5 casing and another set of logs before you set the
6 intermediate -- the -- the intermediate or long
7 casings.

8 To that list, I have suggested several
9 other logs. I have discussed the technical details of
10 these in the testimony, in my written testimony. I'm
11 not going to go through all of these, but I'm going to
12 quickly outline why I'm thinking this.

13 I want sonic for the entire borehole
14 because it -- it provides you with -- with excellent
15 data that you need for building an AOR model, which is
16 to say the geomechanical properties. And you always
17 need to have at least one decent sonic log so you can
18 do your -- your time-to-distance correlations with
19 your seismic sections.

20 I consider neutron porosity a -- a
21 gross oversight at -- at the top of a well, along with
22 resistivity because if you're -- if we're really
23 concerned about identifying all of these USDWs, you
24 need those logs in order to definitively identify
25 aquifers.

1 And by not running both near the
2 surface, which is where most of our aquifers are going
3 to be located, you're depriving yourself of this
4 information. What I'm seeing in permits is that very
5 often you don't have the -- or they have not bothered
6 to run these logs because they're not required.

7 And then the permittees have to go
8 digging through the -- the -- usually the USGS
9 literature on where the aquifers are to identify -- to
10 -- to identify through a literature search,
11 essentially, where their USDWs are. This is silly
12 when you can do it definitively with geophysics, which
13 should be.

14 Let us move on to ambient noise
15 tomography, which is the next slide. I am
16 recommending that you add ambient noise tomography
17 as -- as a primary method for -- for investigating the
18 subsurface because it -- it essentially -- you can do
19 everything -- I don't say you can do everything you
20 can do with traditional seismic with ambient noise
21 tomography, but you can do almost everything.

22 There -- there are some frequency
23 things that you can't do, but that's getting way too
24 technical. The -- the reason that I prefer it over
25 seismic, which I'm going to have to say you're going

1 to have to do on every single project because you just
2 don't have any other good way to find faults.

3 Now, the problem with -- the problem
4 with running seismic is that, at least in my mind,
5 when I was thinking about New Mexico, is that New
6 Mexico has significant -- significant basalt
7 stratigraphy out there.

8 And when you're looking at -- when
9 you're looking at -- basalts, which are the majority
10 of the basalts that you've got in New Mexico, you've
11 got rocks that are extremely resistant to giving you
12 good seismic response.

13 In general, especially if you've got --
14 if you've got layers of basalt flows, what happens is
15 that when you set off your, you know, your vibroseis
16 truck, it sends its signal down, and it hits that
17 basalt layer, and it hits a stack of basalt layers,
18 and then it gets channeled, and it waits.

19 And what happens is that your seismic
20 section gets flooded with overtones and noise. And it
21 makes getting any sort of data out of a traditional
22 seismic extremely difficult.

23 You don't have that problem with
24 ambient noise tomography seismic sections. They are
25 able to image basalts, which is -- which gives it a

1 leg up. You know, it -- it eliminates the problem
2 with doing seismic in basalt. You can do seismic in
3 basalt if you're using ambient noise tomography, which
4 is why I recommend it.

5 Why do I say you're always going to be
6 at least trying to do seismic? Because, you know,
7 we're saying we're looking for -- for all of this
8 stuff in the substance, you know, the structure, the
9 stratigraphy, the faults, the whole package.

10 There are only -- there are only a
11 couple of ways we can get this information, through --
12 through a surface -- through a surface survey, like
13 seismic, through drilling holes and collecting core,
14 or drilling -- drilling holes and collecting wireline
15 logs. This is -- or -- or the equivalent.

16 This is -- this is all we have to
17 investigate the subsurface. And everything else is,
18 you know, solving the mathematical puzzle, what things
19 are. But if you're not running seismic, what are you
20 doing to find the faults? You've got to -- simply,
21 you've got to be running something to find those
22 faults.

23 Seismic is the obvious answer. You
24 can't run seismic in basalt-rich areas. So what can
25 you do? Well, the answer is ambient noise tomography.

1 It is now a mature technology. And as we go to the
2 next slide, it has got the capability of seeing very
3 fine detail with gas resources.

4 I've taken this from -- from the
5 literature from Pulsar Helium. I -- I've been on the
6 Pulsar Helium site several times and -- and have been
7 all over their drilling operation. This is -- they
8 own their own passive ambient -- they've built
9 their -- their own ambient noise tomography network
10 for analyzing the helium resource here in Minnesota.

11 It's a fabulous technology. And you
12 can see the detail is -- is wonderful. It is very
13 sensitive to changes of gas that makes this an
14 excellent method worth tracking -- next slide, please.

15 I've recommended that -- that
16 specifically in terms of emergency response, that the
17 permittees are -- are providing information on
18 training to -- to the -- to the local first responders
19 who would have to respond to a CO2 accident.

20 And that also for a lot of these small
21 rural -- especially these small rural fire departments
22 that don't have a lot of money -- that -- that for
23 ones that don't have sufficient equipment to respond
24 to a CO2 accident, that -- that they provided or
25 helped provide that equipment because SCBA units are

1 rather expensive.

2 And those are the sum, you know, just
3 the sum response. It's -- there has been --

4 No, let's keep going. We'll get that
5 in -- next one. I have four -- four suggested changes
6 to the rule, the first of which is, I believe that --
7 that noise logs should be a mandatory log for doing
8 the mechanical integrity testing. And I'm -- I'm
9 justifying this basically on solely experience.

10 What's this sole experience? The sole
11 experience is Archer Daniels Midland. As we all know,
12 Archer Daniels Midland had both of their monitoring
13 wells fail. And what identified the failure? What
14 nailed the failure? The smoking gun was noise logs.

15 They had all of this -- they had all of
16 this monitoring technology with soil gas. You know,
17 they're monitoring pressure. They're monitoring, you
18 know, they're doing their groundwater sampling.
19 They've got their pressure gauges. By the way, their
20 pressure gauges failed.

21 They have all kinds of monitoring
22 techniques. Multiple, you know, multiple paths to --
23 to test integrity and -- and for leaks. And what
24 nailed it? Out of all of these methods, give us the
25 noise log. Noise logs work. Mandate it.

1 Soil gas monitoring. As you -- as
2 you've probably read in my testimony, I am not a fan
3 of the -- the -- making soil gas monitoring mandatory
4 because I feel that there are instances where soil gas
5 monitoring is not at all appropriate in -- for certain
6 sites.

7 For example, if you are thinking of, as
8 I mentioned in my testimony, converting a depleted oil
9 and gas field into a carbon sequestration site, this
10 is happening right now with TerraVault in California.
11 And the -- it's -- it's a field that's been in
12 production for 110 years and is now depleted, which
13 is -- and -- and -- that -- that often you don't run
14 into completely depleted fields, but they -- they
15 considered this field outside Taft, California totally
16 dead.

17 And then TerraVault is -- is turning it
18 into a sequestration site. There's so much methane
19 and so much other gas in the ground that
20 distinguishing a CO2 signal from a potentially leaking
21 CO2 sequestration at a reservoir 4,000 feet down and
22 distinguishing that from all the other masses that
23 have permeated through the stratigraphic column over a
24 century of oil and gas operation is, frankly, probably
25 impossible.

1 In -- in this case, you know, you can
2 find a site where it's just not valid. There are
3 other sites where the ground respire. You know, the
4 -- the ground breathes, believe it or not. And if
5 you've got relatively, you know, unconsolidated or
6 very permeable strata on top, that strata will
7 breathe.

8 You actually see this in Idaho. And
9 there are water wells in Idaho. We can track
10 barometric pressure changes because the ground is
11 respiring that much. So you get places where your CO2
12 flux may actually be much, much greater than any CO2
13 that might be leaking up.

14 Now, these problems are known. There's
15 been a great deal of research done at Rangely and at
16 Rocky Mountain Arsenal using -- looking at CO2,
17 looking at methane, looking at isotopes that we build
18 gas isotopes, trying to figure out what's the best way
19 to possibly monitoring leaking CO2.

20 There's also been a lot of research,
21 and I depended on a lot on this coming out of Gulf
22 Coast Carbon Center, which is -- which is part of the
23 Texas Bureau of Economic Geology, which is also at the
24 University of Texas at Austin.

25 They've -- they've done a great deal of

1 research on soil gas. And their determinations --
2 these are not mine, these are their determinations --
3 is that just going solely for CO2 flux is -- is not
4 going to be adequate. And -- and the reason for this
5 is because ground respire in places.

6 And there are places, like, say, if
7 you're trying to convert a depleted oil gas field to
8 sequestration site, where the -- where the -- the gas
9 composition already in the soil is going to swamp any
10 signal you see from any leaks.

11 And the solution to this is -- and --
12 and it seems clear looking at the -- the peer-reviewed
13 literature in soil gas -- to use tracer isotopes, to
14 use carbon isotopes that -- that you can -- you can --
15 that you can use carbon isotopes that are -- you can
16 get the isotope signature of your -- your carbon
17 screen so you can test for that signature coming up if
18 it's leaking.

19 You can also use noble gas isotopes.
20 These are inert noble gases that are -- that are
21 present in reservoirs and will carry with leaking
22 injectate, if it is leaking, these -- these have --
23 these have deep earth and mantle signatures. They are
24 very different from the isotopic signatures you see in
25 the atmospheric surface.

1 So you can say, ah, look, we've got
2 noble gas isotopes that have a deep, you know, a -- a
3 deep source signature, that that's -- that's a good
4 signal that says, oh, yes, maybe -- maybe we are
5 seeing a leak here in our soil gas.

6 That is why I am recommending that --
7 that you don't go with straight CO2 flux, which the
8 folks at the University of Texas have -- have, at
9 least to my satisfaction, shown is not -- is not a
10 good path to go forward in the switch over to -- if
11 you're going to mandate soil gas, mandate something
12 that actually works, which is actually using isotopic
13 signatures, which in the peer-reviewed literature has
14 been shown to work.

15 Next one, Hall plot. I'm a huge fan of
16 Hall pots because Hall plots work. And I'm suggesting
17 that you add this into the reporting requirements.
18 Adding it is -- if you look at this from a cost-
19 benefit analysis, I don't think if you -- if you had a
20 spreadsheet set up or if -- if you already had or --
21 or if you're using one of the big, you know,
22 reservoir -- reservoir modeling software packages to
23 build your AOR, like Schlumberger's ECLIPSE or
24 CMG's [sic] GEM reservoir software model, they
25 already -- they already have Hall plot modules built

1 in this software.

2 You just take the data, plug it in, get
3 your Hall plot. Now, why do I like Hall plots?
4 Because you are already requiring your permittee to
5 collect the pressure and the flow information in real
6 time. And what a Hall plot does is that it takes this
7 information, it runs it -- it runs it through a -- it
8 runs it through an interval and then plots -- plots,
9 you know, time versus cumulative injectate on a
10 simple, simple graph.

11 And when everything works, that line is
12 straight. And when things break, for example, when --
13 when your injectate is escaping your reservoir within
14 a deviation in the slope of that line. And also --
15 and then the Hall plots also can show you other
16 failure conditions very quickly.

17 For example, if -- if you're -- if
18 you're plugging up your porosity, say you're injecting
19 your CO₂, and -- and you start growing a whole bunch
20 of minerals in the vicinity, you know, this could
21 happen. It's -- it's not likely to happen, but it
22 might. You could -- you could react that CO₂ with
23 something in the formation, create minerals, grow
24 those minerals in place, reduce your porosity,
25 increase your pressure, and -- and screw up your AOR

1 model and -- and your injection zone, your real
2 injection zone underground. You can see that in a
3 Hall pot. It would deviate the other line.

4 So why am I suggesting Hall plots?
5 Because you're already collecting the data. They're
6 quick to do. They're cheap. They're easy. You know,
7 if -- if I -- if I had -- if I were a permittee, and I
8 was doing my reporting requirements, I'd probably
9 spend a day or two to set up the software or a -- a
10 spreadsheet to create the plot.

11 And then I just submit it every month
12 or every quarter or every half quarter, whatever the
13 reporting requirement is in -- in -- like you're
14 suggesting in New Mexico. I can't remember if -- if
15 at this point -- I've looked at too many state's
16 regulations, and I'm getting to the point in my life
17 where I can't keep them straight in my head.

18 But it's quick, dirty, cheap, no time.
19 And -- and if -- if you're -- if you're doing this
20 very often, if -- if -- you can potentially spot a
21 problem before other monitoring methods -- methods
22 find it. Then let's go to the next slide, please.

23 What we have on top, this is a Hall
24 plot of the Redbird No. 4 well, which is -- which is
25 a -- a Class II well that egregiously leaked. This is

1 the -- the well that implicated -- when I mentioned
2 earlier, the abandoned well that -- that discharged
3 injectate to a tributary to -- to a public reservoir,
4 the -- the abandoned well that -- that ejected the --
5 ejected to the public reservoir, this is -- this is
6 that accident.

7 And I -- I do want to spend just a
8 minute looking at this graph. The top graph is the
9 Hall plot. And you can see the dotted lines are the
10 straight lines that -- that would have -- that would
11 have indicated normal injection without leaks.

12 But if you look at this, there are four
13 places where -- where the well -- the -- the slope of
14 the line is deviated to the right, which in Hall plots
15 indicates that injectate is -- is escaping from
16 your -- your reservoir.

17 And these four times, I don't know how
18 well you can see it on your display, but there are
19 four places on the bottom graph, which is the -- the
20 pressure records that are -- that are circled on -- if
21 you look at the red dots, you'll see sections and dots
22 that are circled and highlighted in yellow.

23 Those four times correspond to the four
24 circles on the Hall plot above. And they correlate to
25 where -- to where injectate was -- was known to have

1 escaped the injection interval as shown on the Hall
2 plot.

3 Now, if we go back to the maximum
4 pressure, if maximum pressure, you know, the -- the
5 pressure record plot on the bottom for Redbird No. 4,
6 if we looked at the maximum allowed pressure, the 90
7 percent -- the 90 percent of the fractured gradient
8 pressure was 840 PSI.

9 If you look at the -- the injection
10 pressure graph on the right, where those -- those four
11 yellow circle places, are places where they were
12 running right at 90 degrees or exceeded it -- or
13 exceeded it by just a bit.

14 They never got to 100 percent, I
15 believe, in this well, but they were running at 90
16 percent and exceeded that 90 percent on four
17 occasions. And those four occasions are well -- are
18 where the -- are where they actually leaked the
19 injectate out of the formation.

20 The consequences of leaking that
21 injecting were not only the surface discharge at the
22 abandoned well into tributary to Lake Veto, but it's
23 also been indicated the infiltration of 28 producing
24 gas wells. And those gas wells were producing from a
25 layer higher than the injection layer. The injection

1 layer leaked big time. In -- in Ohio, we're no longer
2 allowed to inject into that formation because of this
3 accident.

4 And this is why I like Hall plots.
5 If -- if this had been a Class VI project required to
6 provide a Hall plot every month, every quarter, or
7 every six months, someone would've picked this up and
8 said, ah, you've got deviations on your Hall plot.
9 Why aren't you investigating why you, you know, data
10 that indicates that you're leaking out of your
11 injection well?

12 You know, this is -- this is -- that's
13 an accident. And it was caught on the Hall plot.
14 Unfortunately, in this accident, they did the Hall
15 plot after the accident happened, which is kind of
16 like slamming the barn door after the horses have
17 escaped the barn.

18 Injectivity testing. Next slide. I've
19 recommended changes to the wording "injectivity
20 testing." I -- I -- as -- as I said in my -- in my
21 testimony, I found the way that the regulation was
22 written, if you just read the rule, and you don't need
23 the guidance, it's utterly confusing. I -- I
24 recommended that the language be cleared up.

25 I also recommended that -- that a

1 certain type of injectivity test called an
2 interference test not be allowed. And I'm basing this
3 on what happened at Archer Daniels Midland.

4 And the thought that if you do an
5 injectivity -- what happens with an injectivity test
6 is you drill a well and you drill another well, they
7 have to be close enough that you could conceivably
8 communicate between the two wells if you're injecting
9 or -- or pulling out the same layer.

10 And what you do in an interference
11 test, you put one well, the instrument to instrument
12 it, and then you start injecting in the other well.
13 And you measure what's happened in the first well to
14 get a better idea of the hydraulic conductivity and
15 other geomechanical properties that exist in between
16 the two wells.

17 And -- and it's a great test. It gives
18 you -- it can give you really great information. And
19 it gives you information that's actually, you know,
20 along the line instead of a point source, which is the
21 kind of information, pressure information we usually
22 get when you're doing a single-valve injectivity test.

23 It's a great test. But the problem
24 with it is that you're puncturing the confining, you
25 know, you're puncturing the confining zone and going

1 into an injection zone in an AOR -- kind of test. In
2 my mind, the fewer perforations you put into that
3 injection zone, the -- the fewer, the better.

4 You don't want to -- you don't want to
5 be drilling a well close enough to your injection well
6 to do an injectivity test because then you've created
7 another place that you could possibly leak.

8 Well, you know, you're going to say,
9 okay, we build modern wells with modern well
10 construction, modern materials, and they're not going
11 to leak, and they shouldn't leak. Well, that's not
12 what happened at ADM.

13 Both of the monitoring well -- but
14 the -- not the injection wells, the monitoring
15 wells -- both the monitoring wells at Archer Daniel
16 Midland's leaked. The cause of the leak, corrosion.
17 How was that leak -- those leaks found? They were
18 found with noise logs.

19 Our extra perforations into the -- into
20 the injection zone, i.e. these two monitoring wells,
21 they both leak. It -- it -- even when you're doing
22 everything right, you're doing state-of-the-art
23 construction as far as you know, and -- and you're
24 trying, you know, you can still get those wells
25 leaking.

1 So my mind is, based on what's happened
2 at ADM and -- and the revised permit, the revised
3 permit for ADM after they fixed the two wells and
4 resumed operation, basically said, okay, we're going
5 to -- what they did is they pulled those monitoring
6 wells out of the injection layer, and they plugged.

7 Those monitoring wells no longer go --
8 which I believe they only have one monitoring well
9 left. That is not a well that's actually collecting
10 any fluid. It's not a -- it's not a -- it doesn't
11 have perforations. It's -- it's basically
12 instrumented with geophysical instruments. It has no
13 more open perforations to the injection layer.

14 It's still a perforation, you know,
15 through confining zone into the injection. But
16 there's -- there's no way that -- that fluids
17 hopefully can break in and get in to a higher level.

18 That is why I have an objection to
19 injectivity tests, to interference tests. All other
20 injection tests, you know, if you look at the
21 language, this is one place where the language, where
22 the federal regulation language is kind of sloppy.

23 The -- the -- if -- if you look at it,
24 if you look at how the statute is written for
25 mechanical -- for the -- for the testing -- and

1 actually I'm going to look at the -- or maybe I'm not.
2 The statute actually reads, and this is -- this is
3 19.15.43.9.H item number 6, "Upon completion of prior
4 to operation, the owner or operator must conduct the
5 following tests to verify hydrogeologic
6 characteristics in the injection zone, a pressure
7 fall-off test, and a pump test, or injectivity tests."

8 Now, the pair of a pressure fall-off
9 test and a pump test, that's -- that's pretty --
10 it's -- it's -- the first time I ever read this, I --
11 I was really scratching my head because -- because
12 pressure fall-off tests and pump tests are usually
13 done on fuels and not gases.

14 If -- if you're doing gases, usually
15 with -- with gas well testing, you're doing different
16 types of injectivity tests, like step tests or drill
17 stem tests or multiple step tests or interference
18 tests, which I don't think are appropriate here.

19 And if you think about it, a pressure
20 fall-out test is an injectivity test, is an
21 injectivity test by definition. So in my mind, if --
22 if I had my druthers, I would rewrite this statute --
23 or, I'm sorry, I would rewrite this regulation and
24 just say injectivity tests sufficient to determine the
25 -- the hydrogeologic properties that are required for

1 building the AOR model, and I would leave it at that.

2 THE HEARING EXAMINER: Dr. Helm-Clark,
3 would you please wrap up your testimony?

4 DR. HELM-CLARK: I am just about done
5 because this is the last slide. And I think at this
6 point, I am going to conclude. Those are my two
7 procedural changes, seven -- seven recommended
8 additions and four changes to the rule. And I am
9 going to conclude with that.

10 THE HEARING EXAMINER: All right.
11 Thank you very much, Doctor.

12 And, Mr. Pavlik, let's take a 15-minute
13 break, come back at 10:40, and we'll begin the
14 questioning.

15 (Off the record.)

16 THE HEARING EXAMINER: Thank you,
17 Sheila. Let's come back from the break, please.
18 Let's see. I don't see Mr. Pavlik. Can you pin
19 Mr. Pavlik?

20 MR. PAVLIK: I think I'm here online.
21 Can you hear me?

22 THE HEARING EXAMINER: Yeah. I can
23 hear you. I just -- we had been able to see you
24 earlier, so let's see if we can do that. There you
25 are. All right. Great. Thank you, Mr. Pavlik. Go

1 ahead.

2 MR. PAVLIK: Thank you, Madam Hearing
3 Examiner.

4 BY MR. PAVLIK:

5 MR. PAVLIK: Okay, Dr. Helm-Clark. As
6 we go, we'll just go through some of the rebuttal
7 testimony that you've reviewed just to respond to a
8 few of those things. Give you an opportunity to share
9 your thoughts on it. I would like to begin with your
10 suggested 10-mile characterization radius and the
11 half-mile corrective action suggestions within a half
12 mile of certain structures.

13 THE HEARING EXAMINER: Mr. Pavlik, I'm
14 sorry to interrupt. We're getting some serious
15 interfering noise.

16 Sheila, do we know where that's coming
17 from?

18 THE CLERK: I don't see any other
19 microphones turned on -- I can't tell what's going on.

20 THE HEARING EXAMINER: Surely the rest
21 of you can hear that.

22 MR. PAVLIK: Dr. Helm-Clark, is there
23 anything -- is there -- it sounds like there might be
24 a noise against the microphone. Is there anything on
25 your end that might be making a, I don't know, like an

1 interference, almost like a -- not a vacuum, but some
2 sort of a rubbing maybe? Okay. Is that better?

3 THE HEARING EXAMINER: Yes, that's
4 better. Thank you so much.

5 DR. HELM-CLARK: Oh, okay. That's very
6 odd. No, I had a prop underneath the -- the keyboard.
7 I took the prop off.

8 THE HEARING EXAMINER: Thank you.

9 MR. PAVLIK: That solved it.

10 THE HEARING EXAMINER: Okay. Go ahead.

11 BY MR. PAVLIK:

12 MR. PAVLIK: Okay. So turning to the
13 10-mile characterization radius, in Mr. Eales'
14 rebuttal testimony on page 4, he's noted that this
15 10-mile additional characterization radius that
16 includes additional well identification within a half
17 mile of some of these structures that you've noted,
18 schools, hospitals, residential areas, is not
19 necessary because well identification already -- and
20 corrective action already must occur within the area
21 of review. What is your response to that?

22 DR. HELM-CLARK: Well, he's correct in
23 saying, yes, you've got to -- you've got to go and do
24 your well hunt, you know, within your AOR. And -- and
25 his point is that, you know, outside of the AOR,

1 you're not, by -- according to the proposed rule,
2 required to go beyond that.

3 My suggestion, you know, my suggestion
4 does go beyond that. And New Mexico has the option to
5 be more restrictive than the federal regulations. So
6 I have suggested that, you know, within -- within 10
7 miles of a well, wherever there are public buildings,
8 densely -- densely populated residential
9 neighborhoods, that -- that you put a half-mile buffer
10 around these areas and look for, you know, wells
11 within that half mile, you know, within that half-mile
12 buffer zone and do corrective action on them.

13 Because we know, you know, with this
14 growing database of accidents, that -- that we have an
15 accident pathway of transmissive faults to -- to wells
16 that are creating problems in both induced seismicity
17 and the, you know, the escape of injecting fluid at
18 distance outside of the AOR.

19 So within a reasonable distance of a
20 Class VI project, you want to identify those areas
21 that have public buildings, and you want to protect
22 them. That's my point. You want to close down that
23 pathway.

24 MR. PAVLIK: Thank you. And are there
25 instances where your suggested corrective action then

1 would be occurring outside of the area of review of
2 the project?

3 DR. HELM-CLARK: Yes. If -- if
4 you're -- if -- if you're within my -- if you're
5 inside my 10-mile zone, and you've got, say, an
6 elementary school, like -- like the Midwest Wyoming
7 Public School, you -- you draw a half mile around that
8 that -- that school, and you search for all of the
9 wells up around that school, and you take corrective
10 action on the ones that require it.

11 You shut down at that pathway from --
12 from transmissive fault to -- and, you know,
13 discharging injectate through -- throughout.

14 MR. PAVLIK: Thank you.

15 And, Mr. Eales -- so moving to the
16 half-mile setback requirements, Mr. Eales refers to
17 what he calls the primary considerations for the Class
18 VI program. Namely, he refers to those as, one, the
19 injection zone's suitability for injection; two,
20 whether the injection zone will effectively contain
21 the plume; and, three, endangerment of underground
22 sources of drinking water.

23 He suggests that your recommended
24 setback requirements don't have anything to do with
25 those core considerations. Do you agree with that?

1 DR. HELM-CLARK: I disagree with that.
2 And I -- I disagree with that on -- on two different
3 points, the first of which is we have this -- we have
4 this growing knowledge of this pathway, transmissive
5 faults to wells that are creating incidences.

6 When you -- when you transmissive a
7 fault, and -- and that -- and -- and that's injecting
8 fluid, traveling along that fault and finding a well,
9 most of the accidents that -- that we have documented,
10 we have had injectate discharging to the surface.

11 But if you're discharging to the
12 surface, you're passing other layers that are
13 endangered, including production zones for oil and
14 gas, if that's relevant, and aquifers. So if
15 you're -- you're discharging to the surface, you've
16 already potentially endangered more drinking water
17 aquifer.

18 It's -- it's -- the pathway doesn't
19 care. You know, the pathway exists, and it's going to
20 pass aquifers. So they are endangered from this.
21 That's -- that's the first part of my answer.

22 The second part of my answer is that I
23 believe the rule, both the rule and the federal
24 regulations and the federal -- and -- and even the
25 state -- are to protect more than just USDWs. And I

1 will refer you now to -- this is -- I am looking at --
2 at OCD Exhibit 3, which is 19.15.43. I'm specifically
3 looking at 19.15.43.9.G, subpart 1, Part A.

4 This reads, "The owner or operator must
5 ensure that all Class VI wells are constructed and
6 completed to prevent the movement of fluids into or
7 between USDWs or any unauthorized zones."

8 What is the authorized zone? The
9 authorized zone is the injection zone in the AOR. No
10 other zone is authorized. Therefore, if you're
11 discharging to the surface or if you've created a leak
12 that's now putting injectate into a producing oil and
13 gas reservoir, that's an unauthorized release.

14 That's sitting there in -- in my mind,
15 though I'm not a lawyer, but in my mind, any -- any
16 unauthorized zones is everything that's not the
17 injection zone. That includes the surface. That
18 includes catastrophic CO2 releases in the communities.

19 That includes forcing injectate through
20 an abandoned well into a producing oil and gas
21 reservoir like we've seen in Ohio. And we've
22 actually -- I believe there's at least one case in
23 Permian Basin. No, I know there are more cases in
24 Permian Basin, but it's -- it doesn't happen very much
25 in Permian Basin. It's happened an awful lot of

1 places like -- like Idaho where the -- where they
2 shouldn't have been doing this in the first place, to
3 answer that question.

4 MR. PAVLIK: Thank you. Thank you.
5 Can you please elaborate on the connection, if any,
6 between these considerations that you've just
7 identified and protection of New Mexican communities?

8 DR. HELM-CLARK: Can you repeat the
9 question, please.

10 MR. PAVLIK: Yeah. Can you elaborate
11 on the connection, if any, between these
12 considerations that you've identified that Mr. Eales
13 has referred to in terms of protecting underground
14 sources of drinking water and then the protection of
15 New Mexico communities for surface risks?

16 DR. HELM-CLARK: Actually, I -- I think
17 I just answered that. You know, we've got -- we've
18 got a set of pathways by which we know we are leaking
19 fluids, and -- and, you know, this transmissive fault
20 to well field pathway. And if communities are -- if
21 community facilities and neighborhoods are sited
22 with -- with, you know, within a half mile of a well,
23 that might possibly leak -- and it doesn't matter if
24 it's going to a drinking water aquifer or if it's
25 going to a production zone or if it's discharging to

1 the surface, that pathway doesn't change.

2 The physics of -- of forcing the
3 injectate through pressure to -- to leave the AOR and
4 travel to where it can be damaged, that -- that's --
5 it doesn't matter if it's a USDW if it -- it's --it's
6 all unauthorized zone releases.

7 MR. PAVLIK: Thank you. Continuing,
8 Mr. Eales, in his rebuttal testimony on page 3, notes
9 that your suggestions concerning the two-stage review
10 for well identification is not necessary within the
11 regulatory language because the proposed rules need to
12 be able to flexibly address tabulation of all wells on
13 a case-by-case basis. What is your reaction to that?

14 DR. HELM-CLARK: Yeah. I'm kind of
15 scratching my head where he got that. I -- I --

16 MR. PAVLIK: I guess --

17 DR. HELM-CLARK: It -- it's --

18 MR. PAVLIK: -- maybe another way to
19 ask the -- oh, sorry. Go ahead.

20 DR. HELM-CLARK: Yeah. I was going to
21 say you're -- you're already tabulating all the wells.
22 What I'm suggesting is an industry standard tool
23 that's known to work to improve and streamline that
24 process and to make it as thorough as possible. I
25 don't see where -- where it would change on a

1 case-by-case basis.

2 MR. PAVLIK: Okay. Thank you. And
3 sort of along similar lines, on 8 seven of her
4 rebuttal testimony, Mrs. Wachtman -- and I apologize.
5 I hope I have the pronunciation correct there. But
6 Mrs. Wachtman suggests that such a comprehensive well
7 tabulation may be excessive, but it also may be highly
8 costly for project developers. What is your response
9 to that concern?

10 DR. HELM-CLARK: Phase, you know, it --
11 I -- I basically have -- have suggested that -- that
12 you mandate using the phase 1, phase 2 process that
13 the EPA has been using in CERCLA and RCRA for years.
14 This is a streamlined, well-known process. And doing
15 a phase 1 -- doing a phase 1 investigation, which is
16 basically, you know, doing the -- the deep
17 documentation, it doesn't take that much time.

18 You have to put some boots on the
19 ground to -- to go out and interview drillers and
20 landowners and other stakeholders. But other than
21 that, it's no different than doing the regular
22 tabulation. It's just not that much more work. I --
23 I don't know how many phase 1 investigations I've done
24 in my lifetime. I've done a lot. They don't take
25 that long.

1 MR. PAVLIK: Okay. Thank you. Okay.
2 Dr. Khaniani has noted on page 4 of his rebuttal
3 testimony that maintaining a 10 percent safety margin
4 regarding the 90 percent fracture pressure for
5 injection is commonly accepted in engineering
6 practice. What is your reaction to that?

7 DR. HELM-CLARK: Well, you might say
8 that it's -- it's common practice and it's written
9 into the federal regulations for -- for all of UIC.
10 That makes it -- that makes it a standard for UIC. It
11 doesn't make it, in my mind, a generally accepted
12 engineering practice.

13 If -- if -- you were going to suggest a
14 factor of safety of -- of essentially -- I guess it
15 would be 11 percent if we put it into safety factor
16 calculations -- you wouldn't be able to do that in
17 civil engineering, mining engineering, aeronautic
18 engineering, mechanical engineering. In the
19 traditional engineering fields, that's not acceptable
20 engineering practice.

21 It might be a standard practice for
22 UIC, but it's not standard engineering practice.
23 Let's -- let's keep our disciplines safely divided.

24 MR. PAVLIK: And would you -- do you
25 think -- well, I guess you've already summarized this

1 in your direct testimony. But briefly, do you think
2 that even if it is standard in UIC, would you believe
3 that it's protective enough in the Class VI context?

4 DR. HELM-CLARK: No, I do not. And
5 that's why I suggested 80 percent. In California,
6 they're already doing 80 percent. Well, you know,
7 you're going to say, well, California, they do
8 everything the most conservative, you know, of anybody
9 anyway. But, you know, they've got a point.

10 And I am going to refer you back to
11 that Hall plot that we just looked at from Redbird No.
12 4 in -- in Ohio, which was Class II well. And they
13 were -- they were running at -- at their 90 percent.
14 And you can see from their operating practice from the
15 graph that I showed you, there were times where they
16 exceeded that 90 percent.

17 So even if you're running at 90 percent
18 and trying to keep it, you know, keep it below your 90
19 percent limit, a -- a -- an irresponsible operator, as
20 we have already seen, has already violated that and
21 got in the way with it and created an accident.

22 So no, I don't think 90 percent is
23 adequate because it's not going to protect you from
24 the irresponsible operators. And we already have an
25 example of this happening. I'm sure if I look around,

1 I could find a few more.

2 The -- that's why I suggest 80 percent.
3 And -- and for -- and because of accidents like this,
4 this is why California has gone down the 80 percent
5 road. I just think it's prudent. We've -- we've
6 already had one injectate accident because we were
7 running at 90 percent.

8 You know, the -- the whole idea of
9 safety factors is to have a safety factor. And if
10 your safety factor of 90 percent is allowing for an
11 accident, it's not safer.

12 MR. PAVLIK: Okay. Thank you. Moving
13 on to some of the additional logging, sampling, and
14 testing that you've suggested, on page 4 of his
15 rebuttal testimony, Mr. Eales notes that your
16 recommendation to add sonic and porosity measurement
17 before installation of the surface casing is
18 "acceptable from a technical perspective" but that he
19 has concerns about the phrase "best available
20 technology" in the context of fracture finder logs,
21 noting that that could lead to potential speculative
22 technology. What was your intention when using the
23 phrase "best available technology"?

24 DR. HELM-CLARK: Well, first of all,
25 best available technology is a term of art. And it

1 basically just says you're -- you're going to use the
2 best available state-of-the-art stuff you can -- you
3 have at the time. That -- that's just simply what it
4 means.

5 With -- with respect to fracture log
6 logs, if you read -- well, when I read originally and
7 still read the -- the rule as written, both federal
8 and New Mexico's, because they're very parallel in
9 this respect, the -- the fracture finder logs
10 technically, if you want -- if you want to go by
11 strict definitions, a dipmeter log is a fracture
12 finder log.

13 And you can find fracture -- fracture
14 logs with a dipmeter log. I would never run one and
15 use it for finding fractures in any kind of well.
16 It's -- it's more than a half a century old as a
17 method, and it doesn't really do a great job in
18 characterizing your fractures.

19 You should be using one of the modern
20 fracture methods, which is to say, you know, your
21 acoustic or your resistivity method -- methods of
22 creating a fracture image of the borehole. And I
23 provided an example of what these logs look like. I
24 spent a couple of years doing fracture analysis with
25 these kinds of log. They're what you want to use.

1 My intent was to prevent the use of old
2 logging technology, which by my strict reading of the
3 rule would be permitted. It -- but -- but you
4 shouldn't ever be using it. So I wanted to cut off
5 those old methods that are graphical only, that don't
6 give you a good image, and -- and force people to
7 using the modern imaging methods that give you these
8 beautiful records like I showed in my exhibits.

9 MR. PAVLIK: Thank you. Just the last
10 area I'd like to touch on is the emergency and
11 remedial response, some of that rebuttal. So you have
12 recommended a suite of amendments to strengthen the
13 proposed rules, emergency response provisions.

14 Mr. Eales has noted on page 6 of his
15 rebuttal testimony that your suggestions are too
16 prescriptive. What is your reaction to this
17 statement?

18 DR. HELM-CLARK: Well, when I was
19 looking at the emergency response, I was asking
20 myself, what would I be, you know, what would happen
21 if you indeed had a catastrophic CO2 release? What
22 happens is that at the beginning of the accident,
23 someone's going to make a 9-1-1 call. They're going
24 to dispatch a fire engine and a police car.

25 Those guys are going to come up.

1 They're going to see people on the ground. They're
2 going to see, you know, people flailing and having the
3 -- the asphyxiation symptoms of -- of, you know, CO2
4 poisoning. I shouldn't say poisoning because it's --
5 but anyway.

6 The -- and -- and they're going to
7 stop. And they're going to ask, you know, what sort
8 of accident is that? And -- and every single
9 firefighter or policeman has had essentially the --
10 the equivalent of OSHA HAZWOPER training, which is
11 defined in 29 C.F.R. 1910.120. They've either had
12 the -- the whole 40-hour or the 24-hour certification.

13 And you have to renew these every
14 single year with an eight-hour refresher every single
15 year. And what happens with this training is --
16 and -- and I -- I've suffered through more than 20,
17 you know, more than 40 years of this training. So
18 I -- I think I have a little bit of basis upon which
19 to state my opinion.

20 The -- what happens is the -- the OSHA
21 has -- OSHA has a -- a list of things that they want
22 you to -- to address in your annual training. And --
23 and one of them is they recommend that you have
24 modules that run you through, you know, at least on
25 paper, the scenarios of accidents that may be typical

1 of your area.

2 And this is -- this is what I envision.
3 You know, if -- if you're putting in a -- a Class VI
4 project, your -- your Class VI project manager goes
5 off and then talks to the local police and the local
6 fire department and say: "We're putting in a CO2
7 project. Allow us to provide you a lesson plan for
8 your annual, you know, your annual HAZWOPER training
9 that -- that describes CO2 accidents because we're
10 building a CO2 project, and you might have to respond
11 to this."

12 It -- it probably would happen anyway,
13 but I would like to see it actually in the statute.
14 And I found a place when you -- when you look at --
15 when you look at -- I'm looking at here on my computer
16 screen, which is why I'm looking off to the -- to the
17 left -- the OCD Exhibit 3, that's -- that's
18 19.15.43.9.0, there's -- there's a place where you
19 could just simply insert the words -- here it is.

20 "The Emergency Remedial Response Plan
21 must describe how the owner or operator will provide
22 training for local emergency responders." And right
23 there in that sentence, "emergency responders --
24 training for -- provide training for local emergency
25 responders to respond to a CO2 release accident."

1 Put those words right in there, and --
2 and that would make me a happy camper because then you
3 are obliging them to contact those first responders
4 and say, "Hey, what can we do to make your training,
5 you know, include a CO2 accident?" Then you leave it
6 up to the first responders on how they're going to
7 incorporate that into their training.

8 It -- it depends on the state. You
9 know, it -- some -- some firefighters have formal
10 academies. Some do it through the through the
11 HAZWOPER process. There's an equivalent EPA process
12 defined in 40 C.F.R., I believe, 311, that covers
13 volunteer firemen because the -- the OSHA standard
14 action doesn't cover volunteer first responders.

15 But anyway, yes. It -- just insert
16 that there, and I'd be a happy camper. And also
17 you've got, you know, New Mexico is a place with a lot
18 of small rural communities. They may not have the
19 resources to -- to keep up on having enough SCBAs to
20 respond to an accident. The permittee should be
21 helping them out with that cause. That's all.

22 MR. PAVLIK: Okay. Thank you. I'm
23 going to just very briefly share my screen to just get
24 confirmation on what you just noted. Okay. So here I
25 have pulled up your direct testimony. And am I

1 understanding correctly that the language you just
2 mentioned adding here into O, this is -- these are the
3 specific minimums that you suggest adding. That
4 language that you just noted could be added to O might
5 be an alternative way to handle the situation --

6 DR. HELM-CLARK: Yeah. It could be.
7 I -- I forgot that I put in this -- this detailed
8 list, O.

9 MR. PAVLIK: No, that's okay. I just
10 wanted to confirm. I think -- no -- like that's --
11 and as we heard yesterday, there are some concerns
12 about being prescriptive and whether local communities
13 may already be doing things and have needs.

14 So in your opinion, maybe one way to
15 handle the local needs in the local communities may be
16 to insert the language you just mentioned that would
17 then allow them to have that agency over some of this
18 training; is that right?

19 DR. HELM-CLARK: Yes.

20 MR. PAVLIK: Okay.

21 DR. HELM-CLARK: I just, you know, I
22 wanted -- I wanted specific mention that the training
23 would be for a CO2 release accident because there's
24 absolutely no mention in the statute right now that
25 they're going to train for -- for the accident.

1 MR. PAVLIK: Thank you. Appreciate it.
2 And then lastly, last question is, in addition to
3 training, you recommend that the project proponent
4 provides certain technical equipment, such as
5 self-contained breathing apparatuses, to local first
6 responders in order to respond to CO2 emergencies.
7 Can you please elaborate on why that might be
8 necessary?

9 DR. HELM-CLARK: Well, in the event of
10 a large, you know, a large catastrophic CO2 release,
11 the primary hazard is asphyxiation. You need
12 self-contained breathing apparatus that --
13 self-contained breathing apparatuses, or SCBAs is what
14 they call them. They're the SCUBA tanks that you see
15 all the firefighters wearing. And they provide oxygen
16 in atmospheres where oxygen is lacking or where there
17 are toxic concentrations of other constituents that
18 would --

19 MR. PAVLIK: Okay. Great. Thank you.
20 I think those are all of the questions I have. Is
21 there anything that you want to add in terms of any of
22 the rebuttal testimony that you've reviewed? No need.
23 But, you know, this would be your opportunity before
24 we turn to cross-examination.

25 DR. HELM-CLARK: You know, I'm sure

1 I'll think of something ten minutes into lunch, but
2 off the top of my head, I think.

3 MR. PAVLIK: Okay. Sounds good. Thank
4 you so much, Dr. Helm-Clark.

5 No further questions from me, Madam
6 Hearing Officer. And I turn the witness over for
7 cross-examination.

8 THE HEARING EXAMINER: Thank you, Mr.
9 Pavlik.

10 Mr. Tucker, do you have questions of
11 Dr. Helm-Clark on behalf of Oxy?

12 MR. TUCKER: Good morning. I do.

13 THE HEARING EXAMINER: All right.

14 CROSS EXAMINATION

15 BY MR. TUCKER:

16 MR. TUCKER: Hi, Dr. Helm-Clark. Aaron
17 Tucker on behalf of Oxy. How are you?

18 DR. HELM-CLARK: Not too bad.

19 MR. TUCKER: Good. Dr. Helm-Clark, you
20 currently work as a consulting geologist and
21 geophysicist based in Minnesota; correct?

22 DR. HELM-CLARK: That is correct.

23 MR. TUCKER: Are you licensed as a
24 professional geologist in Minnesota?

25 DR. HELM-CLARK: No, I am not.

1 MR. TUCKER: Do you hold any
2 professional licenses?

3 DR. HELM-CLARK: Other than my HAZWOPER
4 certification? No.

5 MR. TUCKER: All right. Thank you.
6 I'd like to turn to your resume. Sorry. I'm getting
7 a little bit of feedback here. I'd like to turn to
8 your resume in Exhibit 2. It's Bates 0028. Can you
9 please identify which of the listed consulting
10 projects involved work in New Mexico?

11 DR. HELM-CLARK: I had no consulting
12 jobs in New Mexico.

13 MR. TUCKER: Okay. Sticking with your
14 resume, can you please identify which of the
15 publications cited in your resume related to the
16 geology in New Mexico?

17 DR. HELM-CLARK: I have no publications
18 related to geology in New Mexico, I do not believe.

19 MR. TUCKER: Aside from this
20 rule-making matter, what is your professional work
21 experience in New Mexico?

22 DR. HELM-CLARK: I have no professional
23 work experience in New Mexico.

24 MR. TUCKER: Okay. I'd like to turn to
25 site characterization. Dr. Helm-Clark, in your

1 surrebuttal, you testified to your experience and the
2 ease of conducting a phase 1 site assessment; correct?

3 DR. HELM-CLARK: That is correct.

4 MR. TUCKER: Is a geophysical
5 evaluation for a Class VI well the same as a phase 1
6 site assessment?

7 DR. HELM-CLARK: No, it is not.

8 MR. TUCKER: The Center for Biological
9 Diversity is recommending a mandatory site
10 characterization area extending exactly 10 miles from
11 every new Class VI well; correct?

12 DR. HELM-CLARK: That is correct.

13 MR. TUCKER: That 10-mile figure
14 applies uniformly regardless of the site-specific
15 geology; correct?

16 DR. HELM-CLARK: That is correct.

17 MR. TUCKER: The federal Class VI rules
18 and the proposed rules here require site
19 characterization across the area of review, but they
20 don't dictate a specific distance; correct?

21 DR. HELM-CLARK: For Class VI, that is
22 correct.

23 MR. TUCKER: And that's because the
24 size of the area of review will vary depending on the
25 project and the site-specific geology?

1 DR. HELM-CLARK: The AOR depends on the
2 model extent of the CO2 plume and the pressure point.

3 MR. TUCKER: So the size of the area of
4 review will vary depending on the project?

5 DR. HELM-CLARK: That is correct.

6 MR. TUCKER: In Exhibit 5 -- this is
7 Bates 0120 -- you provide a list of wells in support
8 of CBD's 10-mile site characterization proposal;
9 correct?

10 DR. HELM-CLARK: Is that the table --

11 MR. TUCKER: That's the table?

12 DR. HELM-CLARK: Yes. Yes.

13 MR. TUCKER: Okay. None of these are
14 class -- none of the wells listed on this table are
15 Class VI wells?

16 DR. HELM-CLARK: Of course not, because
17 we don't have a lot of experience with Class VI wells.
18 Class VI wells are new. We've only been putting Class
19 VI wells into the ground for ten years. And in over
20 the -- over the history of Class VI, most of those
21 permits have come up in the last two years. So we
22 don't have a huge experience.

23 MR. TUCKER: So the list of wells in
24 this are all Class II; is that true?

25 DR. HELM-CLARK: That is not correct.

1 MR. TUCKER: Can you class -- which of
2 the wells on the list are not Class II?

3 DR. HELM-CLARK: I need to -- Fairview,
4 Oklahoma, I could not identify if it was Class I or
5 Class II. The same for Texas. Texas, that actually
6 may have been class -- the -- the -- everyone that's
7 actually identified as wastewater, I could not
8 determine whether or not it was Class I or Class II.

9 In Stillwater, Oklahoma, it was Class
10 II. In Aneth, it was Class II. In Cogdell, it was
11 Class II. In -- in the Gulf of Valencia, Spain, that
12 was a natural gas storage project. In Korea, that was
13 geothermal injection. In -- in Ohio, those were all
14 Class II.

15 Now, you're going to object that --
16 that these are all Class II, and we're doing Class VI.
17 The problem is -- is that we don't -- one, we don't
18 have a lot of experience with Class VI. Back in the
19 1990s and the 2000s, this was recognized immediately
20 by the National Labs and the DOE, which was doing a
21 lot of the original research into carbon
22 sequestration.

23 And their approach was to find
24 reasonable analogs since we don't have 50 years of
25 experience running Class VI. Those analogs are

1 injection wells and CO2 projects and gas injection
2 projects. That covers geothermal. It covers natural
3 gas storage. It covers -- it covers drilling and
4 exploring for natural CO2 resources. And it -- and it
5 covers Class I, and it covers Class II.

6 It actually covers -- they looked at
7 all of the UIC because, if you look at the physics,
8 all injection -- I'm going to argue all injection
9 wells are the same. You're putting a hole in the
10 ground, and you're injecting the fluid.

11 And the things that drive whether or
12 not you get failures are flow and pressure. And
13 that -- and -- and that is the same, regardless of
14 whether the fluid is CO2 or brine or wastewater or
15 natural gas.

16 MR. TUCKER: Ms. Clark, I'm going to
17 turn back to the exhibit. So just to repeat, none of
18 the wells are Class II wells. Do the Class II rules
19 impose the same site characterization requirements as
20 the Class VI rules over the area of review?

21 DR. HELM-CLARK: No.

22 MR. TUCKER: Okay. Do the Class II
23 rules define the area of review differently than the
24 Class VI rules?

25 DR. HELM-CLARK: Oh, very.

1 MR. TUCKER: For instance, the Class II
2 rules allow an area of review with a fixed radius?

3 DR. HELM-CLARK: That is correct.

4 MR. TUCKER: All right. Thank you. No
5 further questions.

6 THE HEARING EXAMINER: Thank you, Mr.
7 Tucker.

8 Is there anyone online to ask questions
9 for NMOGA?

10 MS. GUTIERREZ: We are online, and we
11 have no questions for Dr. Helm-Clark. Thank you.

12 THE HEARING EXAMINER: Thank you very
13 much. Was that Ms. Gutierrez? Okay.

14 MS. GUTIERREZ: Yes. I'm sorry. For
15 the record, Ms. Gutierrez on behalf of New Mexico Oil
16 and Gas Association.

17 THE HEARING EXAMINER: Thank you very
18 much.

19 Ms. O'Grady, do you have questions?

20 MS. O'GRADY: Conservation Groups have
21 no questions. Thank you so much.

22 THE HEARING EXAMINER: Thank you.

23 Let's see. Is Ms. Ruscavage-Barz
24 online?

25 MS. RUSCAVAGE-BARZ: Yes, Madam Hearing

1 Officer. WildEarth Guardians has no questions for
2 this witness. Thank you.

3 THE HEARING EXAMINER: All right.
4 Thank you.

5 Mr. Tremaine?

6 MR. TREMAINE: I do. Thank you.

7 CROSS EXAMINATION

8 BY MR. TREMAINE:

9 MR. TREMAINE: Good morning,
10 Dr. Helm-Clark. My name is Jesse Tremaine. I am the
11 legal director for the New Mexico Oil Conservation
12 Division. Thank you for being here. And thank you
13 for the obvious attention and effort you put into your
14 presentation and your materials.

15 I would like to ask you about a couple
16 specific things in your testimony. In your direct
17 testimony on page 69, starting in line 16, you
18 reference information that you gathered in personal
19 communication with an individual named James Kundert
20 of Atlas Technical; is that correct?

21 DR. HELM-CLARK: That is correct.

22 MR. TREMAINE: Okay. Could you please
23 tell us about when -- I'm not trying to quiz you on
24 the exact date, but the rough date and nature of that
25 communication?

1 DR. HELM-CLARK: Oh, I don't think I
2 can tell you an exact date because I talk to Jim every
3 other week.

4 MR. TREMAINE: Okay. Was it recent?
5 Was it five years ago?

6 DR. HELM-CLARK: Oh, it's maybe within
7 the last year.

8 MR. TREMAINE: Okay. What --

9 DR. HELM-CLARK: And -- and we were
10 talking specifically about the utility of soil gas at
11 TerraVault.

12 MR. TREMAINE: Thank you. What is
13 Mr. Kundert's educational and professional background?

14 DR. HELM-CLARK: James Kundert has --
15 James Kundert has worked in -- I -- I don't know if
16 he's worked for Atlas all with his life. He's
17 certainly worked for Atlas for over 20 years. Atlas
18 is one of the -- one of the larger environmental
19 engineering firms that practices in California.

20 He has a degree in geology from San
21 Jose State University. And he's been doing -- he's
22 been working for environmental engineering firms for
23 all of his career. He specializes in soil gas. He is
24 Atlas's California soil gas go-to guy.

25 MR. TREMAINE: And do you know roughly

1 when Mr. Kundert worked for Atlas specifically related
2 to the Elk Hills CO2 sequestration project?

3 DR. HELM-CLARK: I'm not exactly sure
4 when he was on the site. The project isn't that old,
5 so it has to have been within the last three years.

6 MR. TREMAINE: Okay. And on that
7 point, when did CO2 injection begin at Elk Hills?

8 DR. HELM-CLARK: I'm not sure.

9 MR. TREMAINE: Okay. Do you know what
10 information, data, or analyses that Mr. Kundert relied
11 upon in forming the opinions that you attributed to
12 him?

13 DR. HELM-CLARK: Well, I actually -- I
14 haven't seen the data. I know he was -- I -- I --
15 he -- he spent a couple of weeks out there on the
16 TerraVault site sample.

17 MR. TREMAINE: Okay. Thank you.

18 DR. HELM-CLARK: So -- Atlas is one of
19 the subcontractors doing the soil gas, so --

20 MR. TREMAINE: Thank you. Are you
21 aware of whether CO2 soil gas monitoring is a
22 component of EPA-approved monitoring, reporting, and
23 verification or MRV plans?

24 DR. HELM-CLARK: It is my understanding
25 that the EPA does not mandate it. And it is my

1 understanding that the proposed New Mexico rule does
2 make it mandatory.

3 MR. TREMAINE: Okay. So it's your
4 understanding that you're -- that New Mexico is
5 proposing more stringent requirement for soil gas
6 monitoring?

7 DR. HELM-CLARK: Yes.

8 MR. TREMAINE: Okay. Thank you. I'd
9 like to -- are you aware if EPA has, perhaps not
10 required, but has improved MRV plans, which includes
11 soil gas monitoring as a component? I can try to
12 rephrase. I asked --

13 DR. HELM-CLARK: No, no, I -- I --
14 I'm -- I'm going through my -- I'm going through the
15 permits, I believe, in my head, and I'm going to say
16 I'm not sure.

17 MR. TREMAINE: Okay. Thank you. I
18 want to ask you a few questions about the AOR and the
19 10-mile. I'll try not to duplicate Mr. Tucker's
20 questions, but my understanding of the technical basis
21 that you've outlined in your direct testimony and
22 the -- and your responses to Mr. Tucker are primarily
23 that this is a concern about the migration of
24 injectate through transmissive faults; is that
25 accurate?

1 DR. HELM-CLARK: That is accurate.

2 MR. TREMAINE: Okay. And I believe in
3 all of the context you were referring, and you went
4 over this with Mr. Tucker, again, so we talked
5 about -- you referenced examples with Class I wells
6 and primarily examples with Class II wells; is that
7 correct?

8 DR. HELM-CLARK: That is correct.

9 MR. TREMAINE: Okay. What is the
10 injectate in Class II wells that you are referring to?

11 DR. HELM-CLARK: Class II well --
12 injectate for Class II wells can -- can be water, it
13 can be brine, or it can be CO2.

14 MR. TREMAINE: Thank you.

15 DR. HELM-CLARK: Class II is kind of
16 like the catching -- the kitchen sink of the -- of the
17 UIC program -- it's wide open --

18 MR. TREMAINE: You reference examples
19 related to the Permian basin in your testimony. Which
20 state are the examples that you referenced located?
21 Those in New Mexico or Texas?

22 DR. HELM-CLARK: Did you say "Permian
23 Basin"? I thought -- I thought you said "basin".

24 MR. TREMAINE: I probably had that
25 wrong in my notes. Permian Basin. Thank you.

1 DR. HELM-CLARK: Most -- most of the
2 wells -- the -- the examples that I cite in my
3 testimony in the Permian Basin, I believe, are all in
4 Texas.

5 MR. TREMAINE: Okay. And those
6 examples in Texas, those relate to Class II wells;
7 correct?

8 DR. HELM-CLARK: Yes.

9 MR. TREMAINE: Okay. Are you familiar
10 with the specific permitting and regulatory
11 requirements for Class II wells in New Mexico versus
12 Texas?

13 DR. HELM-CLARK: No, I am not.

14 MR. TREMAINE: Okay. Are you familiar
15 with -- are you aware that historically the maximum
16 injection pressure gradient for Class II wells in
17 Texas has been 0.5 PSI per foot of depth?

18 DR. HELM-CLARK: No, I was not aware.

19 MR. TREMAINE: Okay. Are you aware
20 that that same maximum injection pressure gradient for
21 Class II wells in New Mexico has always been 0.2 PSI
22 per foot?

23 DR. HELM-CLARK: No, I was not aware.

24 MR. TREMAINE: And you referenced
25 another example in Ohio. In the Ohio example, were

1 those Class II wells?

2 DR. HELM-CLARK: I'm sorry? It's --

3 MR. TREMAINE: The Ohio reference in
4 your testimony, were those wells Class II?

5 DR. HELM-CLARK: It was class -- it was
6 a Class II well.

7 MR. TREMAINE: Class II wells. Okay.
8 And are you aware of the -- that maximum injection
9 pressure gradient for Class II wells in Ohio?

10 DR. HELM-CLARK: Yes, I am.

11 MR. TREMAINE: What is that?

12 DR. HELM-CLARK: I'd have to look it
13 up.

14 MR. TREMAINE: Would it by any chance
15 be 0.75 psi per foot of depth?

16 DR. HELM-CLARK: I cannot remember off
17 the top of my head.

18 MR. TREMAINE: Okay.

19 DR. HELM-CLARK: They have it
20 written -- they have it written into their -- into the
21 Ohio Administrative Code, so --

22 MR. TREMAINE: Yes, I believe. Thank
23 you. I'd like to ask you a question about the seismic
24 activity. Are you aware that OCD has a seismic
25 response protocol in place?

1 DR. HELM-CLARK: Yes.

2 MR. TREMAINE: Okay. And are you aware
3 that that seismic response protocol as written is
4 applicable to all injection wells under OCD authority?

5 DR. HELM-CLARK: I was not aware that
6 that -- it extended to all of UIC wells, but I would
7 expect it to. I knew it extended to all of the Class
8 II wells.

9 MR. TREMAINE: Okay. Are you aware
10 that, depending on the magnitude and distance from the
11 well to the epicenter of an observed seismic event,
12 under that protocol, wells may be required to curtail
13 or cease injection?

14 DR. HELM-CLARK: Yes.

15 MR. TREMAINE: Okay. And bear with me
16 based on your last answer. If you assume that that
17 going forward applies to Class VI wells, would you
18 agree that a seismic response protocol would actually
19 be a very fast or immediate response to a seismic
20 event?

21 DR. HELM-CLARK: Yes, it would be an
22 immediate response.

23 MR. TREMAINE: Okay. And is that
24 complimentary or more stringent than relying only upon
25 an area of review reconsideration?

1 DR. HELM-CLARK: I would say that it's
2 complimentary.

3 MR. TREMAINE: Thank you. I want to
4 ask you a couple questions about the proposal to
5 reduce the maximum operating pressure for Class VI
6 wells from 90 percent to 80 percent fracture pressure.
7 You reference in your testimony, California. To your
8 knowledge, does California have EPA Class VI primacy?
9 Or does EPA --

10 DR. HELM-CLARK: Not yet.

11 MR. TREMAINE: Not yet? Okay. So EPA
12 regulates Class VI wells in California currently?

13 DR. HELM-CLARK: That is correct. Yes,
14 that is correct.

15 MR. TREMAINE: Okay. So the 80 percent
16 standard or maximum operating pressure that you
17 referenced in California, would you agree that that is
18 from a separate regulatory structure?

19 DR. HELM-CLARK: Yes, it is. It is not
20 part of the Class VI structure.

21 MR. TREMAINE: Am I correct in
22 understanding that that is related to the low carbon
23 fuel standard?

24 DR. HELM-CLARK: Yes, it is.

25 MR. TREMAINE: Are you aware that the

1 program within the California Air Resources Board has
2 approved exceptions to 90 percent maximum operating
3 pressure?

4 DR. HELM-CLARK: Yes, I am aware.

5 MR. TREMAINE: Okay. Are you aware of
6 any other jurisdiction which limits injection wells,
7 specifically Class VI wells, to 80 percent of fracture
8 pressure?

9 DR. HELM-CLARK: No.

10 MR. TREMAINE: Thank you. On page 10
11 of your direct testimony, you cite the Paradox Basin
12 in Utah as an example of CO2 leakage affecting
13 groundwater. Do you recall what I'm referring to?

14 DR. HELM-CLARK: Yes.

15 MR. TREMAINE: In that example, were
16 the groundwater zones used as drinking water sources
17 or otherwise meet the definition of a USDW were --
18 sorry. Let me repeat or restate. Were any
19 groundwater zones that are used as drinking water
20 sources or otherwise meeting the definition of a USDW
21 impacted in that instance?

22 DR. HELM-CLARK: I do not know if they
23 were formerly classified as USDWs.

24 MR. TREMAINE: Okay. You also
25 referenced on page 14 of your testimony, Satartia,

1 Mississippi CO2 release. Dr. Helm-Clark, what was the
2 source of the release CO2 in that incident?

3 DR. HELM-CLARK: That was a pipeline
4 leak.

5 MR. TREMAINE: And do you have -- it is
6 your understanding that Class VI regulations have
7 regulatory authority over CO2 pipelines?

8 DR. HELM-CLARK: Repeat the question,
9 please.

10 MR. TREMAINE: Are you aware of whether
11 or not the Class VI regulations apply to CO2
12 pipelines?

13 DR. HELM-CLARK: Pipeline regulations
14 are not Class VI.

15 MR. TREMAINE: Thank you. You also
16 referenced on page 16 of your testimony CO2 leakage at
17 the Salt Creek oil field in Wyoming. In what year did
18 that event occur?

19 DR. HELM-CLARK: 2016.

20 MR. TREMAINE: And can you describe
21 what actions the Wyoming regulators took in response
22 to that event?

23 DR. HELM-CLARK: Initially, it wasn't
24 Wyoming regulators. It was the county health
25 department. And the -- and the county health

1 department, I believe, ended up being the -- agency.

2 MR. TREMAINE: Okay. Following that
3 event, did Wyoming subsequently apply for and obtain
4 Class VI primacy?

5 DR. HELM-CLARK: Yes.

6 MR. TREMAINE: Does Wyoming's Class VI
7 program require a default 10-mile characterization
8 radius?

9 DR. HELM-CLARK: It does not.

10 MR. TREMAINE: Okay. I'd like to ask
11 you now about the Lake Nyos event related to page 17
12 of your testimony. You discussed that event, but you
13 also acknowledged that it is not analogous to an
14 engineered CO2 storage; is that fair characterization?

15 DR. HELM-CLARK: That is a fair
16 characterization.

17 MR. TREMAINE: And in the premise of my
18 question, would you agree that that event occurred in
19 1986?

20 DR. HELM-CLARK: Yes. I believe it
21 happened in 1986.

22 MR. TREMAINE: Okay. Sorry. Just
23 restated -- I stated in my question, but were the
24 Federal Class VI regulations promulgated before or
25 after the Lake Nyos event?

1 DR. HELM-CLARK: Oh, after.

2 MR. TREMAINE: After. And as we
3 discussed, the federal Class VI regulations attached
4 do not require a default 10-mile site
5 characterization; correct?

6 DR. HELM-CLARK: That is correct.

7 MR. TREMAINE: Okay. When you talk
8 about the kind of setbacks question, you generally
9 speak about leakage that can occur outside an area of
10 review, but I don't see specific citations to
11 incidents or -- let me rephrase.

12 When you're talking about your
13 experience of leakage that can occur outside an area
14 of review, specifically which UIC well classes are you
15 referring to?

16 DR. HELM-CLARK: Repeat the question,
17 please.

18 MR. TREMAINE: On page 22 of your
19 testimony, you state that operational experience
20 demonstrates that leakage can occur outside an area of
21 review. When you state that, which UIC well classes
22 are you referring to?

23 DR. HELM-CLARK: In this respect, I was
24 referring to -- well, the Salt Creek incident, which
25 was Class II.

1 MR. TREMAINE: Okay. And I think you
2 already answered this. Area of reviews are determined
3 for Class II well classes. So I'll move on. On page
4 29 of your testimony, you refer to the Southeastern
5 Ohio Plum Run examples. Are you able to articulate or
6 compare the completeness and historical coverage of
7 Ohio and New Mexico well databases?

8 DR. HELM-CLARK: You want me to compare
9 the -- the databases?

10 MR. TREMAINE: Well, are you familiar
11 with the well databases for Ohio and New Mexico?

12 DR. HELM-CLARK: Yes. I'm familiar
13 with both.

14 MR. TREMAINE: Okay. And are you able
15 to are you able to characterize the relative
16 completeness and historical coverage for those two
17 databases?

18 DR. HELM-CLARK: For Ohio, I would say
19 that it is lacking. Fr New Mexico, I do not have
20 enough experience in New Mexico to make -- to -- to
21 have formed an opinion.

22 MR. TREMAINE: Okay. Doctor, you
23 referred to the -- well, you propose a setback, a
24 half-mile setback, from specific structures. And you
25 also indicated that you are not an attorney. So I

1 want to ask you if any witness that you are aware of
2 with CBD will be able to present testimony describing
3 the authority for OCD to impose setbacks for surface
4 structures?

5 MR. PAVLIK: Objection. That's --
6 calls -- that's outside of the purview of her
7 testimony. And she wouldn't be aware of other
8 witnesses in any case.

9 THE HEARING EXAMINER: Mr. Termaine?

10 MR. TREMAINE: I just asked if she was
11 aware. I think it's a simple yes or no question. And
12 I can move on.

13 THE HEARING EXAMINER: Please.

14 BY MR. TREMAINE:

15 MR. TREMAINE: Dr. Helm-Clark, so do I
16 understand your testimony to be then that the setback
17 is a good idea from a technical perspective?

18 DR. HELM-CLARK: I'd say it's a good
19 idea from a safety perspective.

20 MR. TREMAINE: Fair. Thank you. Were
21 you aware of the fact that New Mexico actually
22 sponsored a proposed bill to consider providing the
23 OCD authority to impose setbacks from certain surface
24 structures in a prior legislative session?

25 DR. HELM-CLARK: I was not aware.

1 MR. TREMAINE: And were you aware that
2 the legislature declined to take up or pass --

3 MR. PAVLIK: Objection.

4 MR. TREMAINE: -- proposal?

5 MR. PAVLIK: I'm sorry. How is this
6 related to the current Class VI rule-making? And I
7 believe this also calls for legal testimony, which
8 we've just heard that Dr. Helm-Clark can't provide.

9 MR. TREMAINE: It doesn't call for
10 legal testimony. It asks for awareness, and I'm
11 simply laying a foundation, which we all know both of
12 us are going to address in closing.

13 THE HEARING EXAMINER: All right.
14 Would you just rephrase the question?

15 MR. TREMAINE: Thank you.

16 BY MR. TREMAINE:

17 MR. TREMAINE: Dr. Helm-Clark, I think
18 you just stated that you were not aware of the
19 legislative proposal to provide setback authority for
20 OCD. So my next question is, are you similarly
21 unaware that the legislature declined to authorize
22 that authority?

23 DR. HELM-CLARK: I am -- I am also
24 unaware of that.

25 MR. TREMAINE: Okay. Thank you.

1 One moment, Madam Hearing Officer. I
2 think I'm done.

3 Actually, I believe I have one
4 more -- a couple questions, Dr. Helm-Clark. You
5 proposed additional logs in your direct testimony.
6 I'm referring generally to pages 93 through 108. But
7 those include additional sonic density, porosity,
8 fracture logs, noise logs, et cetera.

9 Would you agree that each of those
10 technologies, if all of them were required, may be
11 redundant or technically infeasible?

12 DR. HELM-CLARK: No, I don't agree with
13 that.

14 MR. TREMAINE: Okay. Would you agree
15 that new technologies that come out after the
16 imposition or the promulgation of this rule, if that
17 so happens, may outperform the listed tools that
18 you've mentioned?

19 DR. HELM-CLARK: Yes.

20 MR. TREMAINE: Would you agree that
21 under the current regulatory structure, the director
22 would have the authority during the permitting section
23 of a Class VI application, the director has that
24 authority to select the best site-specific suite of
25 logging and measurement tools?

1 DR. HELM-CLARK: The way the proposed
2 is -- the way the proposed rule is currently --
3 currently written, that is correct.

4 MR. TREMAINE: Okay. Thank you.
5 Dr. Helm-Clark, at a high level, you are proposing
6 physical inspection for wells within certain areas
7 within an area of review; correct?

8 DR. HELM-CLARK: What do you mean by
9 "physical"?

10 MR. TREMAINE: Perhaps "physical" is
11 the wrong word. You propose additional analysis of
12 wells within a certain distance of structures or
13 locations; is that correct?

14 DR. HELM-CLARK: Yes.

15 MR. TREMAINE: Okay. If I misstated
16 that, please correct me. I'm reading from my notes
17 here. I'm not trying to misstate your testimony,
18 so --

19 DR. HELM-CLARK: Okay. Yeah. I --
20 I'm -- I'm --

21 MR. TREMAINE: I'm trying to get to the
22 proposition that you are proposing for certain
23 specific areas, heightened scrutiny of additional
24 wells.

25 DR. HELM-CLARK: Okay.

1 MR. TREMAINE: Okay. And then it is
2 also your proposal that the Commission should require
3 3D seismic monitoring for the entire area of review;
4 is that correct?

5 DR. HELM-CLARK: I didn't specifically
6 say 3D seismic.

7 MR. TREMAINE: Okay. How would you
8 clarify that? What is -- how would you clarify --

9 DR. HELM-CLARK: I -- I -- my -- my
10 suggestion within the 10 miles is to go hunting for
11 undocumented and unmapped faults.

12 MR. TREMAINE: Okay. Thank you for
13 that clarification. I do not have any further
14 questions.

15 THE HEARING EXAMINER: Thank you,
16 Mr. Termaine.

17 Mr. Pavlik, do you have any redirect?

18 MR. PAVLIK: Yes. Thank you. Just a
19 few questions here.

20 REDIRECT EXAMINATION

21 BY MR. PAVLIK:

22 MR. PAVLIK: Thank you, Dr. Helm-Clark.
23 In terms of your work experience, you noted that you
24 don't have any work experience in New Mexico, but is
25 the work experience that you noted during your

1 presentation, does that -- is that transferable to
2 projects that would be located in New Mexico?

3 DR. HELM-CLARK: Most certainly.

4 MR. PAVLIK: And do you know roughly
5 how many or can you generally provide how many Class
6 VI wells there are permitted currently in the United
7 States?

8 DR. HELM-CLARK: It's under -- I -- I'm
9 going to say 26, but please don't quote me on that.
10 The real answer is to go to the EPA website and look
11 at the permitting dashboard and count them up.

12 MR. PAVLIK: Thank you. And have you
13 undertaken permit reviews of any of those current
14 Class VI wells in the United States?

15 DR. HELM-CLARK: None of the permits
16 that I have reviewed are currently injecting.

17 MR. PAVLIK: But you're familiar with
18 the permitting process and you have looked into
19 different aspects of that permitting process within
20 wells that may not be injecting but are going through
21 the process in the United States; is that correct?

22 DR. HELM-CLARK: That is -- that is
23 correct.

24 MR. PAVLIK: And this being the case,
25 are the wells that you have cited in your testimony,

1 are they reasonable analogs to Class VI wells
2 concerning issues that come up in your testimony in
3 your professional opinion?

4 DR. HELM-CLARK: I believe so. And
5 this is not just my opinion. Looking at analogs and
6 extrapolating them to Class VI has been the strategy
7 and the tactics of the National Labs in their -- in
8 their research initiative that started in the 1990s
9 and followed through into the 2000s.

10 This is how the National Labs tackled
11 the problem because we just don't have enough data on
12 Class VI because we just don't have enough Class VI
13 wells to study. So we have to use analogs, and
14 therefore we have.

15 And it's justifiable because, you know,
16 every injection well is the same. You drill a hole in
17 the ground. You're forcing a fluid into a formation.
18 The -- the physics that are relevant are pressure and
19 flow.

20 MR. PAVLIK: Okay. And just to
21 clarify, there were some questions about different
22 regulatory structures in different jurisdictions, but
23 your analysis is not based on any of the legal
24 elements of those. You're looking specifically at the
25 technical components of injection, whether that be

1 Class II or Class VI, in these wells?

2 DR. HELM-CLARK: Yes. I basically was
3 looking at the physics and not the legal aspects.

4 MR. PAVLIK: And -- okay. Thank you.
5 And there was a question about Satartia and different
6 other incidents. Did the Satartia incident involve a
7 CO2 emergency?

8 DR. HELM-CLARK: No, that was a CO2
9 emergency.

10 MR. PAVLIK: And so even though it was
11 a pipeline, it was still the same substance that we
12 would expect to be dealing with in the Class VI
13 regime; is that correct?

14 DR. HELM-CLARK: Yes. And -- and there
15 have been CO2 blowout incidences that have been --
16 that have -- that have approached the conditions that
17 we saw in Mississippi at Satartia. I'm thinking
18 specifically at Sheep Mountain in Colorado. That was
19 a CO2 well blowout, which is -- is a slightly
20 different accident, but it's -- it's still a massive
21 release of CO2 that went on for about a week.

22 It -- it was ejecting softball-sized
23 chunks of -- of frozen, you know, basically dry ice
24 out of the well as it blew out. And there was enough
25 CO2 that car engines in low-lying areas around the

1 blowing-out well stopped running.

2 So we're looking at putting enough CO2
3 in the low-lying areas around that -- that blowout
4 well that -- that would've been IDLH. And I'll
5 reiterate, immediately dangerous to life and health.

6 MR. PAVLIK: Thank you. And there was
7 a question about the New Mexico well database. When
8 you were preparing your direct testimony, did you
9 include any review of wells that were on the OCD's NM
10 Well database?

11 DR. HELM-CLARK: Yes, I did,
12 because -- because of the issues of -- of age in terms
13 of plugging wells, because before 1953, there was no
14 standard for the proper plugging of the well. I
15 wanted to see -- I -- I wanted to see in in the
16 historic basins, which is to say the San Juan Basin
17 and -- and the Permian Basin, how many wells, you
18 know, the -- the age of wells, how dense they were,
19 and what the plugging records looked like.

20 So I -- I did a -- I -- I spent a while
21 diving into New Mexico's well database and reading
22 well records.

23 MR. PAVLIK: Okay. Thank you. And
24 though you can't speak to the comprehensiveness writ
25 large of that database, did you notice any wells that

1 were missing plugging information or documents that
2 you would have otherwise --

3 DR. HELM-CLARK: Oh, because there were
4 plugging. In -- in general, wells -- wells that
5 were -- I -- I noted in general, wells drilled before
6 1970 very often had inadequate or no plugging records.

7 MR. PAVLIK: Thank you. And I guess in
8 your opinion -- actually, I think that's good. That's
9 all I have. Thank you. Thank you, Dr. Helm-Clark. I
10 really appreciate your time.

11 And Madam Hearing Officer, I'm done
12 with redirect.

13 THE HEARING EXAMINER: All right.
14 Thank you very much, Mr. Pavlik.

15 Let's come back after lunch for
16 questioning by the commissioners. Let's come back at
17 1:00. Thank you.

18 (Off the record.)

19 THE HEARING EXAMINER: Yes. It's 1:00.
20 Let's come back from lunch break, please. This is
21 just an announcement for everyone in the room and on
22 the platform and if you have not already been notified
23 via e-mail by Sheila. We will be going through the
24 questioning of Dr. Helm-Clark from now to 10 minutes
25 of 3:00, that's 2:50. And then we're going to break

1 for the day and resume at 9 a.m. in the morning.

2 All right. Dr. Helm-Clark, you're
3 okay? Dr. Helm-Clark, can you hear me? You can hear
4 me?

5 MR. PAVLIK: Doctor?

6 Madam Hearing Officer, it appears that
7 she cannot hear us. I just confirmed that with her.
8 So maybe I can give her a quick call and see if we
9 can --

10 THE HEARING EXAMINER: Thank you,
11 Mr. Pavlik.

12 MR. PAVLIK: She's logged off and is
13 attempting to rejoin, I believe.

14 THE HEARING EXAMINER: Thank you.
15 Dr. Helm-Clark, can you hear me?

16 DR. HELM-CLARK: I can hear you.

17 THE HEARING EXAMINER: Terrific.

18 DR. HELM-CLARK: They said they would
19 make -- computers would make our lives easier.

20 THE HEARING EXAMINER: Reflect on that
21 for a moment.

22 Commissioner Ampomah, would you like to
23 begin the Commission questions?

24 COMMISSIONER AMPOMAH: Sure --

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EXAMINATION

BY COMMISSIONER AMPOMAH:

COMMISSIONER AMPOMAH: Dr. Helm-Clark, thanks so much for your testimony and also supporting this rule-making, or at least trying to make it much better. Appreciate your efforts.

So I do have a couple of questions. And we'll also go through the rule, you know, and also walk through some of the options that you are putting across. And then also I'll show, you similar to the yesterday panel, I do have some recommendations, and I'll show that to you to see if you have any concurrence on that or you have any issues with that.

Now, so in your testimony, at least today, you talked about our state is trying to build a new industry, that is, the UIC Class VI is new. Now, my question to you is that, is the industry not already here, because we do have at least one permit that is going through EPA review?

DR. HELM-CLARK: I'm not sure I understand the gist of your question.

COMMISSIONER AMPOMAH: So you're saying that the state is going to build a new industry; right? You got that correctly? In your statement, when you were presenting, you talked about the state

1 is building a new industry.

2 DR. HELM-CLARK: All right. I -- when
3 I -- when I have said that Class VI wells are
4 relatively new, and I believe I have said
5 "relatively," I also stated that, you know, the -- the
6 rules -- the rules started about ten years ago. So we
7 have 10 years' worth of experience. However,
8 initially, there weren't very many wells, and there
9 still aren't a lot of wells, so our experience is
10 still young.

11 COMMISSIONER AMPOMAH: Yeah. But the
12 industry is still is already here because whether New
13 Mexico has primacy or not, operator can go to EPA and
14 still get the permission to bring that industry to New
15 Mexico. Would you agree with that?

16 DR. HELM-CLARK: Oh, yes. Certainly.

17 COMMISSIONER AMPOMAH: Now, you also
18 said that in -- some of your recommendations, you're
19 saying that there has to be a summary for especially
20 the AOR. You're talking about all the important
21 things that the operators use so it would be quick
22 review for the Division; is that correct?

23 DR. HELM-CLARK: Well, for anybody
24 reading the permit.

25 COMMISSIONER AMPOMAH: But don't you

1 believe that there is a summary requirement in the
2 current EPA rules or even the Class VI permits that
3 you have reviewed?

4 DR. HELM-CLARK: To my knowledge, there
5 is no requirement to include the summary that I have
6 suggested.

7 COMMISSIONER AMPOMAH: Okay. But you
8 also don't dispute that summaries for each of the
9 grants are a requirement as part of the permit
10 application to EPA?

11 DR. HELM-CLARK: I don't know off the
12 top of my head. I'd have to look at the guidance.

13 COMMISSIONER AMPOMAH: Okay. Then I
14 can tell you that for all the permits that I've seen
15 or reviewed, there is a requirement. You know, you
16 have to provide summary for each of the paths or the
17 attachments that you submit to EPA.

18 Now, you talked about models are black
19 box. You said models are always a black box. And
20 then also you've reviewed some of these applications.
21 So my question to you is that, as an expert, are you
22 not able to distinguish between garbage in and garbage
23 out type of models?

24 DR. HELM-CLARK: I'm not sure what your
25 question is getting at.

1 COMMISSIONER AMPOMAH: I can repeat it
2 again because I'm building on something.

3 DR. HELM-CLARK: No, no, no. I --
4 it -- it's -- when you're reviewing -- when you're
5 reviewing a Class VI permit, and -- and the AOR is
6 based on a model, you have to take it on faith that
7 the modeling software is doing its job. As a
8 reviewer, that leaves you looking at whether or not
9 the inputs into the model are appropriate and
10 adequate.

11 COMMISSIONER AMPOMAH: Now, so let me
12 ask. So do you have extensive experience in
13 Louisiana?

14 DR. HELM-CLARK: I have experience in
15 Louisiana. Whether or not it's extensive is an
16 argument about -- about adverbs.

17 COMMISSIONER AMPOMAH: But so you said
18 you've reviewed some Class VI applications?

19 DR. HELM-CLARK: Yes. I've reviewed
20 Class VI permits in Louisiana.

21 COMMISSIONER AMPOMAH: And I'm asking
22 you, do you have extensive knowledge about the
23 geology, let's say, the -- everything about Louisiana?

24 DR. HELM-CLARK: Well, I -- I -- I'm
25 not God. I'm not "inimminent," so I don't know

1 everything. But I know a great deal about the -- the
2 saline -- the saline formations along the Gulf Coast
3 that they are using to -- that they -- they are
4 proposing to build Class X wells -- Class VI wells in.
5 I do have a -- I do have a -- a well-logging analyst
6 experience on the Gulf Coast and in Gulf Coast data.

7 COMMISSIONER AMPOMAH: That is very
8 good extension. So at least you do know the geology
9 of Louisiana. So when you are reviewing these
10 permits, that geology also comes into play. Your
11 knowledge of that geology comes into play as you are
12 reviewing models with garbage in and garbage out;
13 would that be correct?

14 DR. HELM-CLARK: Yes.

15 COMMISSIONER AMPOMAH: So then let me
16 ask you. So if the conservation groups, they are
17 saying that, let's say, New Mexico doesn't need to
18 necessarily, you know, have primacy; right? Don't you
19 believe that New Mexico having primacy will give them
20 even the opportunity to use the local knowledge of
21 their geology to make, in fact, decision to more or
22 less protect human life?

23 DR. HELM-CLARK: I'm not sure what the
24 question is here. Are you asking me to make a
25 decision whether or not the -- the Division has

1 adequate technical expertise in New Mexico geology to
2 evaluate its own programs? I hope so.

3 COMMISSIONER AMPOMAH: Yeah. But not
4 necessarily. So, you know, I started building the
5 premise of my question about you have geological
6 experience in Louisiana. So at least based on that
7 experience, you should be able to -- I mean, you are
8 reviewing applications from Louisiana.

9 And your local knowledge is helping you
10 to really make determinations whether the adequately
11 presenting data represent the geology or not. So I'm
12 not saying you don't you believe that it is also
13 appropriate for the authorities that do know the
14 geology of New Mexico to oversee the permitting
15 process for Class VI in New Mexico?

16 DR. HELM-CLARK: Yes.

17 COMMISSIONER AMPOMAH: Now, still on
18 the review process, so as you go through the review,
19 going through the review, you spot all these
20 deficiencies in the permit. When you point those
21 reviews out to -- those deficiencies out to EPA, can
22 you explain to the Commission the next steps after
23 your review?

24 DR. HELM-CLARK: Usually when I am
25 doing a review, I go through, I -- I try to find the

1 deficiencies in the permit. I write them up, and I
2 send them back to my client, who usually either is
3 going to send in commentary on a permit during a, you
4 know, during an acceptable commentary period, or
5 they're taking my comments, and they're preparing them
6 for a -- a filing for a civil suit to potentially stop
7 a permit.

8 COMMISSIONER AMPOMAH: Oh, so you are
9 not actually review for EPA or let's say the state of
10 Louisiana?

11 DR. HELM-CLARK: My reviews have been
12 for clients who are participating in the public
13 commentary period.

14 COMMISSIONER AMPOMAH: Oh, thank you
15 for the distinction then. I was -- to a rabbit hole
16 here. Thank you. Then -- let me ask. So don't you
17 believe that the current rule that OCD is putting
18 forward here more or less cover fluid movement into
19 unauthorized zones? There is a way for OCD to more or
20 less ensure their compliance met in instances where
21 fluid moves from the authorized zones to the --to an
22 unauthorized zone?

23 DR. HELM-CLARK: I'm not sure what the
24 question is.

25 COMMISSIONER AMPOMAH: Okay. So you

1 talked about the fact that the rule, the Class VI
2 rule, should not just only be for the USDW, but it
3 should be for others as well. So I'm asking you, is
4 an operator not uncompliant if, let's say, their fluid
5 moves from the authorized zone to any unauthorized
6 zone, and is that not presented independent -- oh, in
7 the application before us?

8 DR. HELM-CLARK: I feel like you're
9 asking two different questions here.

10 COMMISSIONER AMPOMAH: Okay. I'm not,
11 actually. But I'm asking, so is it true that your
12 testimony was that the rule has to go beyond USDW;
13 right?

14 DR. HELM-CLARK: Yes. That is my
15 testimony.

16 COMMISSIONER AMPOMAH: And then I'm
17 asking you. In the current rule that is before us
18 today, don't you believe that in that rule, OCD is
19 also saying that you cannot have your fluid moving out
20 of the authorized zone to any unauthorized zone,
21 either being a mineral zone or let's say a USDW zone?

22 DR. HELM-CLARK: I believe the
23 regulation is -- is forbidding the motion of -- of
24 fluids out of the injection zone, and -- and any
25 movement of the fluid out of the injection zone should

1 be an unauthorized release.

2 COMMISSIONER AMPOMAH: So then you
3 agree with me that the rule that we are promulgating
4 today is not really actually just protecting only the
5 USDW?

6 DR. HELM-CLARK: That is correct.

7 COMMISSIONER AMPOMAH: Thank you. Now,
8 you talked about monitoring wells. Son you know, as
9 an expert, I want to discuss this with you. Are you
10 in favor of monitoring wells penetrating through
11 injection zones?

12 DR. HELM-CLARK: Not really.

13 COMMISSIONER AMPOMAH: And based on
14 your geophysical background, do you believe that there
15 could be some tools in such a way that we do not
16 necessarily penetrate through the injection zone, but
17 we can still get the pressure data from the injection
18 zone?

19 DR. HELM-CLARK: Well, you know, it --
20 it -- you're -- you're getting into some pretty
21 technical questions. You can -- you can embed -- you
22 can embed gauges in your injection well that will
23 measure pressure, and it'll measure pressure down the
24 hole during operation, that that pressure is -- is
25 probably not going to really accurately reflect

1 what -- what the static case would be.

2 So I'm not sure where you're going with
3 this. You -- there are gauges that can go down the
4 hole. I'm not sure how great they are. At ADM, they
5 all failed, so --

6 COMMISSIONER AMPOMAH: Okay. So I was
7 thinking more of the -- as you said, I mean, if you
8 have the gauge right within the injection zone, then
9 you are not too sure whether there's a true
10 representation of the pressure within the, let's say,
11 the injection zone or not. But I was thinking
12 about --

13 DR. HELM-CLARK: Well, what you're
14 getting -- what you're getting is that, you know, if
15 you've got a pressure -- if you've got a pressure
16 gauge, it's right at the perforations where you're --
17 where you're injecting. You're going to get -- you're
18 going to get a dynamic measurement. That's what I
19 should have said. The -- the measurement's going
20 dynamic. It's not going to be static.

21 COMMISSIONER AMPOMAH: It's not going
22 to be static. Okay. So -- but I'm more interested in
23 the static point. So assuming we are drilling a
24 monitoring well, is there a way to drill the
25 monitoring well in such a way that we do not

1 necessarily penetrate into the injection zone, but we
2 can still somehow, based on geophysical advancement,
3 get the static pressure that we're looking for?

4 DR. HELM-CLARK: I don't think so.

5 COMMISSIONER AMPOMAH: Okay. Now,
6 don't you believe that if New Mexico decided that,
7 okay, we are not going to allow monitoring wells to
8 penetrate into the injection zone, from EPA, if you
9 can put on EPA hat here, would they not say that New
10 Mexico rules is less stringent than EPA's rules?

11 DR. HELM-CLARK: Well, you know,
12 we're -- we're that's a problem, quite literally. You
13 know, you -- you want as few as penetrations as
14 possible, but you still have to measure that pressure.
15 Even at ADM, they still have one well left that's not
16 an injection well that is measuring pressure directly,
17 but it has no perforations.

18 They've got a -- they -- they --
19 they've got a gauge, they've got a packer, and the
20 rest of it's basically just a solid hole with a -- in
21 it. That well could still leak.

22 COMMISSIONER AMPOMAH: Okay.

23 DR. HELM-CLARK: But they basically
24 minimized all of their penetrations. They pulled
25 their monitoring wells out. And part of the revised

1 permit demanded that they pull those monitoring wells
2 out of the injection zone.

3 COMMISSIONER AMPOMAH: So do you
4 believe that if the Commission decides that we are not
5 going to mandate injection -- let's say monitoring
6 well penetrating into the injection zone and leave
7 that at a discretion of the operator -- no, of the
8 director, where operator has to prove to the director
9 how they are going to do the measurements to his
10 satisfaction. Do you believe that would be
11 appropriate?

12 DR. HELM-CLARK: I believe it would be
13 workable.

14 COMMISSIONER AMPOMAH: Thank you. So
15 you talked about the fact that we cannot have too many
16 Class VI projects in a particular area. Do you
17 remember that testimony?

18 DR. HELM-CLARK: Was that my testimony
19 or someone else's?

20 COMMISSIONER AMPOMAH: No, your
21 testimony, because you talked about the fact that we
22 have too many wells -- we have too many wells and even
23 specifically to Class VI. Let me see if I can find
24 that. Give me a second, please. Okay. So on page 53
25 of your direct, a question was asked, "Does the

1 presence of multiple Class VI projects" -- are you on
2 that page, page 53 of your direct?

3 DR. HELM-CLARK: The presence of
4 multiple projects --

5 COMMISSIONER AMPOMAH: Are we on the
6 same page?

7 DR. HELM-CLARK: We are on the same
8 page.

9 COMMISSIONER AMPOMAH: Okay. So your
10 testimony is about -- so there was a question asked
11 you about the presence of multiple Class VI projects,
12 and you made references to someone and then Permian
13 Basin; is that correct?

14 DR. HELM-CLARK: Yes.

15 COMMISSIONER AMPOMAH: Now, let me ask
16 you. So based on your experience, how many projects,
17 based on your experience, should be permitted in,
18 let's say, San Juan and then in Permian to still make
19 it a safe project?

20 DR. HELM-CLARK: That's not what I was
21 writing about in this section.

22 COMMISSIONER AMPOMAH: No, you --

23 DR. HELM-CLARK: If you read the -- if
24 you read the question, it reads, "Does the presence of
25 multiple Class VI projects or other fossil fuel

1 exploration and production in the same geographic
2 area?"

3 And what I was thinking was all of
4 those oil and gas wells and injection wells are -- are
5 those multiple wells. If you want to ask me how many
6 Class VI projects you want to place in one area, I
7 would say that should be dependent on your AOR --
8 your -- your AOR and permit.

9 COMMISSIONER AMPOMAH: So then it
10 doesn't necessarily depend on how many penetrations we
11 have but the AOR?

12 DR. HELM-CLARK: For citing multiple
13 Class VI projects, you should be looking at those
14 AORs.

15 COMMISSIONER AMPOMAH: Now, let me ask
16 you. So do you know the potential injection zones in
17 the San Juan Basin that could be suitable for CO2
18 injection for Class VI?

19 DR. HELM-CLARK: Not off the top of my
20 head.

21 COMMISSIONER AMPOMAH: Do you know the
22 potential injection zones in the Permian Basin that
23 could be utilized for CO2 injection?

24 DR. HELM-CLARK: Not off the top of my
25 head.

1 COMMISSIONER AMPOMAH: Do you know the
2 number of penetrations in the San Juan Basin that goes
3 through the potential injection zone that could be
4 utilized for Class VI?

5 DR. HELM-CLARK: No, not off the top of
6 my head.

7 COMMISSIONER AMPOMAH: Do you know the
8 number of penetrations in the Permian Basin in the
9 formations that could be targeted for Class VI
10 injection?

11 DR. HELM-CLARK: What kind of
12 penetrations? If you're talking injection wells --

13 COMMISSIONER AMPOMAH: Yes.

14 DR. HELM-CLARK: -- we're talking
15 thousands. If you're talking oil and gas wells, we're
16 talking tens of thousands.

17 COMMISSIONER AMPOMAH: So the fact is
18 that you don't really have good knowledge about the
19 potential injection zones that we are -- that could be
20 targeted in New Mexico. So when you say there are --
21 of wells in there, I just want to understand the risk
22 that we are looking at here so the Commission can make
23 a determination as to whether then how should we make
24 the corrective action provision more stringent? So
25 that is why I'm asking you all those questions.

1 DR. HELM-CLARK: Well, with regards to
2 the section that -- that you referred to, I was
3 worried about a large number of penetrations in
4 these -- in these historic oil and gas basins. When
5 you're making a determination whether or not a -- a
6 site is acceptable for Class VI, you should be looking
7 at the conditions in the ARR.

8 In terms of multiple penetrations, what
9 that really affects is your search for a, you know,
10 your search for current abandoned plugged and orphaned
11 wells. That's what it affects. And that's what I was
12 trying to address in this question.

13 COMMISSIONER AMPOMAH: Thank you. Now,
14 another issue that has come up with regards to, let's
15 say, sited wells probably away from residential and
16 then also from schools. Now, I thought your client is
17 telling the Commission that we don't even have the
18 authority to even -- these rules that we are looking
19 at. Why should we make it more complex?

20 DR. HELM-CLARK: For the sake of
21 safety.

22 COMMISSIONER AMPOMAH: But do you
23 believe that we do have the authority to do that?

24 DR. HELM-CLARK: I don't know. I'm not
25 a lawyer. I don't know -- I don't know what New

1 Mexico requires.

2 MR. PAVLIK: I'm sorry. I'm sorry.
3 This is a legal -- I just I just need to briefly state
4 that Dr. Helm-Clark really cannot speak to the
5 authority of the Commission or OCD when it comes to
6 what they can and cannot do in this program.

7 THE HEARING EXAMINER: And thank you
8 very much, Mr. Pavlik.

9 And just a reminder to everyone to
10 avoid talking on the end of someone else's sentence.
11 It makes it hard to capture your words on the
12 transcript.

13 Dr. Helm-Clark, it's a perfectly fine
14 answer if you want to note that the question calls for
15 a legal conclusion.

16 Go ahead, Commissioner.

17 BY COMMISSIONER AMPOMAH:

18 COMMISSIONER AMPOMAH: Okay. So let me
19 ask. So from your Exhibit 5, you showed a table. And
20 that table on there shows different places where there
21 has been a lot of issues; is that correct?

22 DR. HELM-CLARK: That's correct.

23 COMMISSIONER AMPOMAH: Can you tell the
24 Commission if any wells in there is in New Mexico?

25 DR. HELM-CLARK: Does this list include

1 any -- any wells in New Mexico?

2 COMMISSIONER AMPOMAH: Yes. So does
3 that not tell you something in terms of how New Mexico
4 is actually operating the existing classes of wells?

5 DR. HELM-CLARK: No, because it's
6 acausal.

7 COMMISSIONER AMPOMAH: Now, you talked
8 about the potential 80 percent, moving from 90 to 80
9 percent. Do you have any references, publications,
10 engineering standards that really supports the 80
11 percent?

12 DR. HELM-CLARK: Well, as -- as it's
13 already stated in my written testimony, I was working
14 off of the California Low -- Low Fuel Standards, which
15 do use 80 percent. And also I was basing it off of
16 the Redbird No. 4 release -- release accident in Ohio.

17 COMMISSIONER AMPOMAH: And based on
18 that release accident, did Ohio change their fracture
19 pressure to 80 percent?

20 DR. HELM-CLARK: No. They lowered it
21 even further for that particular well and -- and then
22 they -- they did two different things. And they have
23 now forbidden injection into the zone that was being
24 used for injections. So they made two different
25 remedial actions in response to this incident.

1 COMMISSIONER AMPOMAH: Yeah. So -- but
2 I -- so I'm asking, did they make a general rule that
3 all wells has to go probably 80 percent or lower?

4 DR. HELM-CLARK: No, they did not --
5 they did not make a general rule. They made a
6 specific rule for Redbird No. 4. In other incidences
7 in Ohio, they have made similar responses. Where --
8 where in Ohio, what's been happening when they get
9 these incidents is either discharges out of wells or
10 induced seismicity, Ohio's response has been to lower
11 the pressure and the flow rate for the individual
12 wells implicated in the accident.

13 COMMISSIONER AMPOMAH: So that one --
14 does that not imply that, in this case, the director
15 will have the ability to do that?

16 DR. HELM-CLARK: Well, in Ohio the
17 director had the ability to do that.

18 COMMISSIONER AMPOMAH: So even in New
19 Mexico, the current rules that we're looking at, the
20 director, would the director not also have the ability
21 to more or less implement that same restrictions on a
22 case-by-case basis, based on the current rule that
23 we're looking at?

24 DR. HELM-CLARK: As the current rule is
25 currently written, that provision is indeed included.

1 COMMISSIONER AMPOMAH: Thank you. So
2 we don't necessarily have to go to 80 percent because
3 the director do have the authority to go to 80 percent
4 or even go below that if the situation were --

5 DR. HELM-CLARK: The way the rule is
6 currently written, that is correct.

7 COMMISSIONER AMPOMAH: Now, somewhere
8 in your testimony, so you said that -- you talked
9 about the number of wells that are being permitted to
10 Class VI. Do you recall that?

11 DR. HELM-CLARK: No.

12 COMMISSIONER AMPOMAH: Okay. Let's go
13 to page 61.

14 DR. HELM-CLARK: Page 61.

15 COMMISSIONER AMPOMAH: Page 61, and I'm
16 looking at question 13. And in there you're talking
17 about -- so the question was, "Do you have any
18 examples of what can happen when identification is not
19 properly undertaken for a Class VI project?" So you
20 are responding to that. And then you said, "As of May
21 1, 2026" --

22 DR. HELM-CLARK: Hold on. I'm not --
23 I'm not -- I've got two different page numbering
24 schemes in my notebook. So I'm trying to find the
25 correct page. I'm trying to find the correct page, 61

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1 here.

2 COMMISSIONER AMPOMAH: In your direct
3 testimony, that --

4 DR. HELM-CLARK: Right.

5 COMMISSIONER AMPOMAH: Yeah.

6 DR. HELM-CLARK: So you're referring
7 to, "Do you have examples of what can happen when
8 identification is not properly undertaken?"

9 COMMISSIONER AMPOMAH: Yeah. So -- and
10 I'm reading through, "As of May 1, 2026, only 47 Class
11 VI well construction permits have been approved in the
12 U.S."?

13 DR. HELM-CLARK: That's correct.

14 COMMISSIONER AMPOMAH: Do you believe
15 it's a lot or it's not a lot?

16 DR. HELM-CLARK: That's not a lot.

17 COMMISSIONER AMPOMAH: Now, don't you
18 believe, that with that, the government is spending
19 sufficient amount of time in reviewing these permits
20 to make sure that whatever permits they sign off on
21 protects the USDW, human health, and all the concerns
22 that you may have?

23 DR. HELM-CLARK: If you're asking me
24 whether or not I believe the EPA is doing an adequate
25 job, I don't know.

1 COMMISSIONER AMPOMAH: Now, let's go to
2 page 65, still on that same document. Now, so I'm
3 looking at the last -- getting to the last bottom, the
4 question there. Please, are you on page 65?

5 DR. HELM-CLARK: Page 65?

6 COMMISSIONER AMPOMAH: Yes. So you are
7 discussing about some of the tools that you could
8 recommend, you know, if, let's say to look for any
9 hidden wells that could be within area of review.

10 Now, do you know the current strategy
11 by OCD in reviewing even the -- the wells that are in
12 AOR, area of review, for even, let's say, Class II
13 wells? Are you familiar with the entire process, how
14 they make sure that operators really identify all the
15 wells within that particular AOR?

16 DR. HELM-CLARK: If you're asking me if
17 I have knowledge about how OCD is managing its Class
18 II, I do not know. I do not have specific experience
19 in New Mexico.

20 COMMISSIONER AMPOMAH: So you do not
21 unnecessarily have experience as to how OCD makes sure
22 that when a permit application comes in, they've
23 exhausted all the potential searches to identify wells
24 that more or less need some kind of corrective action.
25 Is that your testimony?

1 DR. HELM-CLARK: That is correct. I --
2 I do not have intimate knowledge of how OCD manages
3 its programs and does its evaluation.

4 COMMISSIONER AMPOMAH: Now, so there
5 was a discussion about you are requesting that we put
6 in the rule a 10-mile radius from, let's say, a Class
7 VI well to more or less take care of any potential
8 faults that might not necessarily be discovered as
9 part of the site characterization. Is that a good
10 description of your testimony?

11 DR. HELM-CLARK: Yes.

12 COMMISSIONER AMPOMAH: Now, you said
13 you've reviewed some of these UIC Class VI permits.
14 Now, let me ask you, do you agree with me that it is a
15 requirement that you have to perform a regional site
16 characterization and the local site characterization?
17 Yes.

18 Do you believe that the original site
19 characterization is even more than your 10-mile radius
20 that you are requesting?

21 DR. HELM-CLARK: No.

22 COMMISSIONER AMPOMAH: Do you know, are
23 you familiar with, let's say, can you give the
24 Commission estimated radius from the injection well,
25 proposed injection well, to the AOR? Do you know, do

1 you have a fair idea as to the typical distance, at
2 least for the ones that you've reviewed?

3 DR. HELM-CLARK: For the ones that I
4 would review, the -- the mean -- the mean distance is
5 8 miles. I did not -- I did not calculate the median
6 or the mode because I didn't consider this an, you
7 know, a -- an exhaustive list.

8 COMMISSIONER AMPOMAH: So the 8 miles,
9 now, you also agree with me that AORs are determined
10 after we've done the site characterization and we've
11 built a model; is that correct?

12 DR. HELM-CLARK: That's correct.

13 COMMISSIONER AMPOMAH: So if I
14 challenge your 10 mile and say that there's a high
15 possibility that, if you consider the original
16 analysis that an operator has to work on and the
17 locale, it is going to be anything -- most of these
18 models has to be more than what you are suggesting
19 here because there is a possibility that the AOR could
20 go beyond 10 miles.

21 DR. HELM-CLARK: I can't imagine any
22 case where an AOR would go 10 miles.

23 COMMISSIONER AMPOMAH: You sure?

24 DR. HELM-CLARK: I'm pretty damn sure.

25 COMMISSIONER AMPOMAH: Then I would

1 tell you that in New Mexico it's possible.

2 DR. HELM-CLARK: Well, then you will
3 prove me wrong.

4 COMMISSIONER AMPOMAH: Well, I'm not
5 testifying. I was just --

6 DR. HELM-CLARK: So -- so -- but --
7 but, you know, in -- in all of the projects, you know,
8 I -- I've not seen in AOR greater than 2 miles --

9 COMMISSIONER AMPOMAH: And what is the
10 rate?

11 DR. HELM-CLARK: -- all of the permits
12 that I've looked at.

13 COMMISSIONER AMPOMAH: And what is the
14 rate of these wells that you looked at?

15 DR. HELM-CLARK: The rate?

16 COMMISSIONER AMPOMAH: Yeah. What is
17 the permitted rate of these wells?

18 DR. HELM-CLARK: Well, it depends on
19 whether or not it's a Class II or Class VI.

20 COMMISSIONER AMPOMAH: Oh, well, we're
21 talking about Class VI.

22 DR. HELM-CLARK: Well, if we're talking
23 about Class VI, I would have to look up the numbers on
24 the permits that I have reviewed because I don't have
25 them off the top of my head.

1 COMMISSIONER AMPOMAH: And I'm telling
2 you that. I mean -- okay. So you've preparing for
3 this. Definitely you've looked at. I mean, if I put
4 OCD expert in chief, who has done multiple UIC Class
5 VI permits, he will tell you, you know, if you just go
6 to the EPA website and look at all the permits that
7 are right now going through review, I thought probably
8 you could have done that before you suggested the 10
9 miles. If you did not do that analysis, then justify
10 the 10 miles to the Commission.

11 DR. HELM-CLARK: I picked the 10 miles
12 based on the incidences that are actually happened and
13 have happened. So I'm looking at evidence of -- of
14 incidences that have done damage. And, you know, as I
15 said previously, the -- the greatest -- the -- the
16 greatest distance I put on that table was 20 miles.

17 There's actually two cases where it was
18 22 miles or 25 miles, but those were -- those were
19 geophysical injections, and I rejected them as
20 being -- analogous. But 20 miles is -- is -- seems to
21 be the limit. Most of them seem to be falling in
22 between -- in between 5 and 8 miles. We've got ones
23 that are that are popping out at 12.

24 The damaging earthquakes in Oklahoma --
25 let me look at my table. The -- the -- we've got -- a

1 we've got a 5.1 in Oklahoma. That's 12 miles. So I
2 picked 10 miles because it was half the -- half the
3 farthest distance because 20 miles just seemed too
4 extreme, so I halved it.

5 Now, if you look at New Mexico's
6 seismic protocol, if you look at the -- the protocol
7 kicks in, in a 10-mile zone from an epicenter. So by
8 your own protocols, that seems to be reflected in it.

9 COMMISSIONER AMPOMAH: Yeah. So you
10 are using Class II wells to more or less -- analogous
11 for Class VI? Now, let me ask you. So for a typical
12 commercial Class VI project, what is a typical rate
13 are we talking about here?

14 DR. HELM-CLARK: The class -- Class VI,
15 I can't -- I -- I don't have the rate, the pumping
16 rates off, the top of my head. I would have to look
17 at that up.

18 COMMISSIONER AMPOMAH: Now, you follow
19 this industry for some time now. And even you
20 reference DOE work here and there. How does DOE even
21 classify a commercial CO2 project?

22 DR. HELM-CLARK: DOE doesn't classify.

23 COMMISSIONER AMPOMAH: So would you
24 agree with me that DOE will see a project as
25 commercial project if they can inject at least 50

1 million metric tons of CO2 for a period of at least 30
2 years? Will you dispute that?

3 DR. HELM-CLARK: Repeat the question,
4 please.

5 COMMISSIONER AMPOMAH: You made
6 reference to, let's say, DOE in your testimony about
7 DOE looking for analogous and trying to build this
8 type of characterization effort. Is that correct?

9 DR. HELM-CLARK: What the DOE was doing
10 in the 1990s and the 2000s is that they were -- were
11 directed that the -- national labs, certain national
12 labs, not all of them, were directed to research the
13 overall topic of carbon sequestration.

14 COMMISSIONER AMPOMAH: So since then,
15 have you followed how DOE, at least in the business
16 administration, put in an effort to really
17 commercialize CO2 injection projects?

18 DR. HELM-CLARK: Yes. They -- they
19 sponsored several, several, several projects.
20 Wellington and ADM are included in them.

21 COMMISSIONER AMPOMAH: So with that,
22 I'm telling you that the government sees the
23 commercial CO2 injection project as being able to at
24 least sequester 50 million metric tons of CO2 for a
25 period of about 30 years. Will you agree with me on

1 that?

2 DR. HELM-CLARK: Yes.

3 COMMISSIONER AMPOMAH: With that, I am
4 telling you that with that kind of huge injection
5 volume, your AOR is going to be more than even the 10
6 miles that you are proposing to the Commission.

7 DR. HELM-CLARK: As I said before, I
8 have not seen any permits that have AORs that large.

9 COMMISSIONER AMPOMAH: You probably
10 have to go search. So I'm trying to --

11 DR. HELM-CLARK: -- I will have to --
12 if -- I -- I'm not, you know, if you say that it's out
13 there, and I haven't found it yet, then I haven't
14 found it yet.

15 COMMISSIONER AMPOMAH: Okay. So for
16 someone with experience in -- in this type of
17 environment, I find it extremely difficult to believe
18 that a 10-mile radius should be enacted in a rule. I
19 mean, to me, it's too small.

20 And your concern -- the concerns that
21 you are raising, what I'm saying is that, independent,
22 there is a regional geology requirement. And then
23 also there is a local geology requirement. So that
24 satisfies more or less the concerns that you have.
25 Will you agree with me on that?

1 DR. HELM-CLARK: Repeat the question,
2 please.

3 THE HEARING EXAMINER: Would you slow
4 down?

5 THE CHAIR: Yeah. Yeah, I'll also ask
6 the commissioner to slow down for the rest of us on
7 the platform.

8 COMMISSIONER AMPOMAH: Okay. It's a
9 little bit -- okay. Okay. Thanks. Thanks for that.
10 So what I'm saying is that the 10 miles that you want
11 us to really put in the rule, I do have a little bit
12 of concern with that.

13 Now, the concerns that you raised, I'm
14 saying that the permit requires a regional geology,
15 which would be more or less like a -- wide assessment
16 of the regional geology.

17 So if there is any faults -- faults,
18 any faults, any conduits that are within the regional
19 spectrum, that needs to be captured as part of the
20 original assessment. And then also there is the local
21 assessment as well.

22 So I'm saying that your concerns that
23 you have, it's more or less captured in the rule. And
24 then also even it goes beyond, in most cases, the 10
25 miles that you are proposing. And I was asking if you

1 agree with me on that.

2 DR. HELM-CLARK: If you have an AOR
3 that's truly that large, then having -- having --
4 then -- then adding an additional 10-mile site
5 characterization requirement to search out
6 undocumented faults would indeed be unnecessary.

7 COMMISSIONER AMPOMAH: Thank you. I
8 appreciate that. So I'll run through quickly over the
9 rules and some of the adjustments that you are
10 requesting that I've not really touched on. I want to
11 just touch on both -- some -- few -- some of them.

12 So I'm looking at page 6. And this one
13 will be OCD's Exhibit 3. And in your case, it's going
14 to be your Exhibit Number 1. So let me know when you
15 are ready.

16 DR. HELM-CLARK: Okay. Exhibit Number
17 1, what page?

18 COMMISSIONER AMPOMAH: Page 6.

19 DR. HELM-CLARK: I'm there. I'm
20 waiting.

21 COMMISSIONER AMPOMAH: Oh, okay. Thank
22 you. So you are proposing at least some amendments to
23 the rule that we're looking at. Now, so don't you
24 believe that, I mean, at least the last paragraph that
25 you highlighted, so to ensure all wells within the AOR

1 --area of review are identified, they will now -- test
2 that and will take both a non-physical review. Can
3 you explain to the Commission what you mean by non-
4 physical review?

5 DR. HELM-CLARK: This is -- this is
6 what I meant as -- as parallels to the phase 1, phase
7 2 investigation structure. It basically -- it -- I --
8 I'm recommending the moral equivalent of a phase 1
9 investigation to try to locate documentation of wells.
10 It's purely a -- a -- it -- it -- it's -- it's purely
11 a -- a document search and -- and an inquiry of people
12 who may have knowledge about wells that may be in the
13 ground that are undocumented.

14 COMMISSIONER AMPOMAH: But I thought
15 you testified to the Commission that you do not have a
16 fair idea as to the databases all in New Mexico
17 data -- needs researched. Do you recall that
18 testimony?

19 DR. HELM-CLARK: Could you repeat the
20 question, please?

21 COMMISSIONER AMPOMAH: So in your
22 testimony, or at least based on the discussions that
23 we are having, you communicated to the Commission that
24 you do not have a fair idea as to the databases that
25 NMOCD may require and in order to look into, even for

1 the existing classes of wells?

2 DR. HELM-CLARK: I don't believe that
3 that's what I said. I said that I was not deeply
4 familiar with their database. When I say I'm not
5 deeply familiar with the database, what I meant is
6 that when you go into their database, different
7 databases give you different arrays of information
8 that you can query.

9 For example, when I go into New
10 Mexico's database, I was actually able to get
11 extremely detailed plugging records on -- on a lot of
12 wells that have been -- that have been plugged, you
13 know, since the 1970s.

14 Whereas if I go into, for example,
15 Ohio's database, it's extremely difficult to get any
16 plugging information or even to download any pressure
17 reporting reports. I believe in New Mexico you can do
18 so. But so the particulars, the loops and the jumps
19 that you can make a database run through, that's what
20 I'm referring to.

21 COMMISSIONER AMPOMAH: Yeah --

22 DR. HELM-CLARK: The data that you may
23 get out of a particular database may not be complete.
24 In Ohio, I would expect it not to be complete. In
25 West Virginia, I would expect it not to be complete.

1 I'm not sure what kind of data exactly I'd be getting
2 in -- in New Mexico.

3 For example, I don't know off the top
4 of my head whether or not I can go into New Mexico's
5 oil and gas database and start downloading LAS files
6 to look at well logs. I know that in -- in West
7 Virginia, I can do that. In Ohio, it's very
8 difficult. So it just depends on where you are --

9 COMMISSIONER AMPOMAH: Exactly.

10 DR. HELM-CLARK: -- as to the
11 capability of the database.

12 COMMISSIONER AMPOMAH: Exactly. So you
13 are using Ohio and other places to more or less
14 suggest some changes for New Mexico without actually
15 looking deeper into how many databases do we have in
16 New Mexico? Are they accurate or not? So I'm finding
17 it difficult to justify this provision that you are
18 recommending to the Commission.

19 DR. HELM-CLARK: I'm -- I'm a bit
20 confused here because if I were putting together a
21 permit, whether or not Ohio or whether or not any
22 particular state's database is giving me all of the
23 information I want is not as important as trying to be
24 able to get the information.

25 I'm -- I'm, you know, the -- the

1 information you've got -- the -- the information you
2 need to extract is the same regardless, based on the
3 minimum federal standard. And whether or not your
4 particular state's database can deliver all of that
5 is -- is not germane to the rule. The rule says
6 you've got to get this information however you get it.

7 COMMISSIONER AMPOMAH: Okay. I'll move
8 on. So let's go to page 8. And I think we've talked
9 about the 10-mile issues. And also, as I understand,
10 you are not a lawyer, so I don't need to talk to you
11 about the citing of the half mile away from schools
12 and all of that. But I mean, it was your testimony.

13 Now, so Sheila, is it possible to bring
14 up the suggested language that went through with OCD's
15 witnesses yesterday? If you can pull that up on the
16 screen so I can walk through that with Doctor? Okay.
17 Yeah. So let's go to number 3. If you can scroll
18 down number 3 and number 4, if possible for them to
19 be -- okay.

20 BY COMMISSIONER AMPOMAH:

21 COMMISSIONER AMPOMAH: So, Doctor, I
22 want you to -- so these are the suggested
23 recommendation is that based on my review of the
24 entire rules, I am putting across considering -- for
25 the Commission's consideration.

1 So looking at number 3 and then number
2 4 on the screen and looking at what you are proposing
3 on page 8, that would be E, section E. That is the
4 area of review and corrective action. Would you agree
5 with me on these suggested languages? If you could
6 take some time to read through it? And then you can
7 respond when you're ready.

8 DR. HELM-CLARK: Just numbers 3 and 4?

9 COMMISSIONER AMPOMAH: Yes. Number 3
10 and 4 at least for now, yes.

11 DR. HELM-CLARK: That's nice language.
12 I like that.

13 COMMISSIONER AMPOMAH: So do you
14 believe that if the Commission adopts what I'm showing
15 you, the concerns that you have that you've raised
16 under Section B will be more or less covered?

17 DR. HELM-CLARK: If you're referring
18 to -- if Section B is referring to my suggestion for
19 an executive summary, that would be correct.

20 COMMISSIONER AMPOMAH: Yeah. Okay.
21 Okay -- yes.

22 DR. HELM-CLARK: If you -- if you use
23 something like this instead of my suggestion, I'd be
24 happy.

25 COMMISSIONER AMPOMAH: Okay. Thank

1 you.

2 DR. HELM-CLARK: I think this is
3 perfectly accurate.

4 COMMISSIONER AMPOMAH: Thank you.
5 Appreciate that. So let's go to page 9. Yeah, in
6 page 9, I will not talk about the non-physical review
7 and the physical review. I think we've gone through
8 that. But I'm looking at C.

9 Now, the language that you are
10 proposing, don't you believe that these are all --
11 this is a typical type of assessment that is actually
12 done as part of the corrective action for UIC Class VI
13 permit?

14 DR. HELM-CLARK: We're talking about C,
15 determine which abandoned wells in the area of review,
16 blah, blah, blah, blah?

17 COMMISSIONER AMPOMAH: Yes.

18 DR. HELM-CLARK: And the question is,
19 is this not --

20 COMMISSIONER AMPOMAH: Yeah. Let me
21 rephrase it and say that when I look at this, I do see
22 typical Class VI permits more or less will cover this.
23 So don't you believe that this will be much better to
24 put in a guidance than in a rule?

25 DR. HELM-CLARK: Well, you know, that's

1 really up to you folks. I would like to actually see
2 it in the rule because, you know, there -- the -- I --
3 I can -- I can see a scenario where somebody's just
4 slacking together a tabulation of wells, and -- and
5 they're unaware or -- or they're willfully ignorant of
6 the -- the fact that well-plugging standards radically
7 began to change in the 1950s.

8 That's why I suggested you go into the
9 rule, and you have the capability to be more stringent
10 if you choose. And that was my suggestion.

11 COMMISSIONER AMPOMAH: Yeah. And you
12 mean -- so you suggested that -- so if I read the
13 first line, you're saying, "Determine which abandoned
14 wells in the area of review have been plugged," and
15 then you put "not plugged." So would that also not be
16 changing the intent of the original rule? Or does
17 that at least supplement all the additional changes
18 that you are making?

19 MR. PAVLIK: Sorry. If I can just
20 interject briefly. I think that Dr. Helm-Clark could
21 speak to the technical difference or lack thereof
22 between determining whether a well has been plugged
23 properly or not been plugged properly. But I don't
24 think she can speak to the intent of the rule or any
25 of the legal considerations of that. Thank you.

1 COMMISSIONER AMPOMAH: Thank you. I'll
2 move on.

3 BY COMMISSIONER AMPOMAH:

4 COMMISSIONER AMPOMAH: So, Doctor,
5 let's look at number 5, the number 5, the new number 5
6 that you've created, yeah. So as I read through that,
7 my question to you is, does these wells need to be
8 within the area of review, or it has to be outside or
9 could be outside the area of review?

10 DR. HELM-CLARK: These -- this -- this
11 is -- these -- this suggestion basically is covering
12 wells outside of the area of review that would be
13 within a half mile of a public facility or densely
14 populated residential neighborhood that's within the
15 10 mile that I propose.

16 COMMISSIONER AMPOMAH: Okay. Now, so
17 let me ask. We are trying to protect human health;
18 right? So why should there -- why should it be across
19 our board and just have to be for a particular area?
20 I don't know if I'm -- I can repeat it if you want me
21 to.

22 DR. HELM-CLARK: Well, when I -- when
23 I -- was looking at incidences that have happened,
24 that are happening, you know, that are happening
25 outside the area of -- of an AOR, you know, basically

1 have traveled a fair distance from the injection well,
2 my -- my thought was across the board, we want to
3 protect public facilities like hospitals and schools.

4 And the way to do that is to look at,
5 you know, is -- is the shutoff, the -- the second half
6 of that pathway transmissive fault to wells? You
7 know, if you build that buffer zone around those
8 public facilities that's a half mile, then yes,
9 that -- that should be across the board.

10 COMMISSIONER AMPOMAH: Okay. Now let's
11 look at number 7. Now, the number 7, you are saying
12 that the mandatory reevaluation of AOR shall occur
13 upon any of the following. So you give pretty good
14 points there. Let me ask, in the current rules that
15 we're looking at, is that not -- would that not be at
16 the discretion of the director to really -- or the
17 director doesn't have the ability to more or less
18 request these reevaluations?

19 DR. HELM-CLARK: The -- the rule as
20 it's currently written is that the permittee is
21 required to come up with their own list.

22 COMMISSIONER AMPOMAH: That the
23 director will agree to?

24 DR. HELM-CLARK: And the -- yes . And
25 the director must agree to it.

1 COMMISSIONER AMPOMAH: So the director
2 do have the authority to either accept, modify, or
3 change any of them?

4 DR. HELM-CLARK: Yes. As the rules
5 permit.

6 COMMISSIONER AMPOMAH: Now, if I had to
7 go through line by line on those, so if I look at B,
8 for instance, so that would be on page 10, you're
9 saying that a change in the carbon dioxide injection
10 rate, volume, or pressure in the excess of the limits
11 found in the injection permit or AOR. Now, so if I
12 take the last portion, the pressure in excess of the
13 limits, is that not in violation?

14 DR. HELM-CLARK: That is in violation.

15 COMMISSIONER AMPOMAH: And do you have
16 some ideas with regards to how the Division -- I mean,
17 the OCD deals with non-compliance?

18 DR. HELM-CLARK: I have no idea how OCD
19 manages its enforcement of non-compliance.

20 COMMISSIONER AMPOMAH: But you and I
21 agree that they are in violation; right?

22 DR. HELM-CLARK: I would consider that
23 a violation.

24 COMMISSIONER AMPOMAH: And so if you've
25 not really researched OCD rules to see how they deal

1 with non-compliance, I mean, how do we put that in the
2 rule to make sure that --

3 DR. HELM-CLARK: This is --

4 COMMISSIONER AMPOMAH: Excuse me.

5 So --

6 DR. HELM-CLARK: So this is to --

7 sorry.

8 COMMISSIONER AMPOMAH: Yeah. Excuse
9 me. To make sure that, let's say, how they deal with
10 their non-compliance is probably not sufficient. So
11 then probably you can go on and support this rule.

12 DR. HELM-CLARK: I'm not sure what
13 your -- what -- what you're asking here. The --
14 the -- whether or not this is a violation is -- is not
15 germane as to whether or not it becomes a criteria or
16 reevaluate the AOR. This is simply a list for
17 conditions that trigger a reevaluation of the AOR.

18 COMMISSIONER AMPOMAH: Yeah. And I'm
19 saying that once a party or, let's say, an operator
20 violates their permit, there are other procedures that
21 OCD normally goes through. So that is all I'm saying,
22 that there would be -- or they're doing a crosscheck
23 to make sure that they are in compliance with the
24 other rules when, let's say, an operator become
25 non-compliant.

1 DR. HELM-CLARK: I'm not sure if you
2 are requiring a response here.

3 COMMISSIONER AMPOMAH: So let's look at
4 even the D. Now for the C, even for the C, you're
5 talking about change in composition of the injected or
6 change in fluid production rates of the injection
7 zone, overlying zone. The first question there, can
8 you give out the threshold as to the compositional
9 change?

10 DR. HELM-CLARK: Well, if the amount of
11 moisture in your CO2 stream increases, you increase
12 the corrosivity of the entire stream, and -- and that
13 is going to change conditions in the well. And it's
14 going to -- yeah, it's -- that -- that's going to
15 change things.

16 And it's going to change how things
17 react also when it -- when it hits the perforations
18 and gets into the formation. So yeah, that's a
19 condition where I believe you should be reevaluating
20 the AOR.

21 COMMISSIONER AMPOMAH: Yeah. So don't
22 you believe that that has to be in a guidance where
23 there could be thresholds even negotiated as part of
24 the permit conditions between the operator and the
25 director?

1 DR. HELM-CLARK: Well, when I was
2 looking at this in writing my commentary, I was -- I
3 was looking at permits and not just the permits that
4 that -- that I have reviewed. I was looking at other,
5 you know, I looked at a wide -- and as many permits as
6 I could probably find my hands on recently.

7 And -- and I would say there's probably
8 six or seven permits I looked at and -- and put rules
9 together. The -- I was basing it off of the remedial
10 action plans that -- that permittees have been
11 submitted.

12 And as I said prior and as I said
13 before in -- in -- at the beginning of my testimony,
14 if I see somebody doing something all the time, and
15 the EPA wanting it and requiring, it looks like
16 something that's being required. If it's the EPA is
17 demanding it or Louisiana demanding it all of the
18 time, that looks like a requirement to me.

19 If it's being required all the time, it
20 should be in -- in the regulation. That's how I
21 think. Whether or not you decide whether it belongs
22 in the guidance is not up to me.

23 COMMISSIONER AMPOMAH: Thank you. Can
24 we go to page 14?

25 DR. HELM-CLARK: Sweet.

1 COMMISSIONER AMPOMAH: Yeah. Okay.
2 Yeah. So you are requesting some additional logs.
3 Now, the sonic, you made a strong justification. Now,
4 do you believe that if we are not obligating or
5 mandating 3D seismic, do we need to mandate sonic?

6 DR. HELM-CLARK: Well, even if you're
7 mandating the -- even if you're asking for 2D seismic,
8 you should still have that sonic.

9 COMMISSIONER AMPOMAH: Okay. Now --

10 DR. HELM-CLARK: If you're doing any --
11 if you're doing any seismic, you really need that
12 sonic. And, you know, and -- and to be -- and to be
13 honest, you don't have to run that sonic log at the
14 injection well. You can run that sonic log in your
15 monitoring log because you just -- you need enough
16 information to do the -- the time and the depth
17 correlation. That's what you're really needing.

18 If you've already -- actually if
19 there's a well in the neighborhood, and I'd say within
20 two, three miles that's got a nice sonic log, go ahead
21 and use it. Why -- why, you know, reinvent the wheel?

22 COMMISSIONER AMPOMAH: So then you will
23 agree with me that any company that should 3D seismic,
24 whether mandated or not mandated, will still go for
25 sonic log; is that correct?

1 DR. HELM-CLARK: Yeah, I would say
2 that's correct.

3 COMMISSIONER AMPOMAH: Okay. Now,
4 let's look at the porosity logs. So you suggested
5 porosity logs, and at the same time, you also
6 suggested density logs. So can you explain the
7 distinction between the two?

8 DR. HELM-CLARK: Well, neutron porosity
9 is -- is -- you're -- you're shooting neutrons through
10 a formation. And what you're doing is you're
11 exciting -- you're exciting basically water -- sorry.
12 I can't speak straight today. You're -- you're
13 bombarding the formation with neutrons, and you're
14 getting radiation back.

15 The amount of radiation you get back is
16 actually in the neutron porosity log proportional to
17 the amount of hydrogen that you've got within your
18 area of interrogation site.

19 In -- the -- the assumption is in the
20 neutron porosity log that you're, you know, that
21 you're -- you -- that that hydrogen is living entirely
22 in the pore spaces. And this gives you a porosity
23 measurement, which then usually is corrected.

24 The density -- the density log, that is
25 an active gamma tool. And you're radiating -- you're

1 radiating the borehole wall -- wall with -- with gamma
2 rays. You're getting content radiation back. It is
3 directly proportional to the density of your area of
4 interrogation of the site. And that's the difference
5 between the two logs.

6 COMMISSIONER AMPOMAH: Yeah. But here,
7 I'm not seeing neutron porosity logs. I'm seeing
8 porosity logs. So that is why I'm asking you that.

9 DR. HELM-CLARK: Usually in the -- in
10 the -- in -- in well log analysis, when you say
11 porosity log, it is assumed that you're talking about
12 the neutron porosity log.

13 COMMISSIONER AMPOMAH: I thought that
14 we do have at least two porosity logs, density and
15 then the neutron. So --

16 DR. HELM-CLARK: Well, you can use a
17 density log to get porosity, but it's not -- it's --
18 it's -- you can use -- you can use the density log to
19 get a porosity measurement. It's not the same
20 measurement as the neutron porosity log.

21 COMMISSIONER AMPOMAH: Now --

22 DR. HELM-CLARK: But you're making
23 assumptions. You have to make assumptions and do a
24 calculation to get that porosity measurement out of
25 the active gamma log.

1 COMMISSIONER AMPOMAH: Thank you. So I
2 will go to the last one here or the last sentence. So
3 I'm close to the last sentence. So when you say that
4 using best available technology, who determines this?

5 DR. HELM-CLARK: In -- in this case, it
6 would have to be the Division reviewing the permit.
7 You're the guys who were making the decision to grant
8 the permit. You're the guys who made that decision.

9 COMMISSIONER AMPOMAH: Now --

10 DR. HELM-CLARK: I would hope that
11 somebody -- I would hope that somebody came in and
12 said, "Oh, we want to run a dipmeter log." I -- I
13 would hope somebody would say: "Hey, you know, that's
14 a 60-year-old log. Use something more modern."

15 COMMISSIONER AMPOMAH: Chair, do you
16 want to say something?

17 THE CHAIR: May I? Yeah. It was just
18 to follow-up on that. That language seems very
19 reminiscent to a term used in the Clean Air Act. Are
20 you envisioning the sort of same legal -- the same
21 analysis when it comes to the best available control
22 technology and air quality? And is that the basis, or
23 am I misreading or reading in to your intent here?

24 DR. HELM-CLARK: Well, I want to --
25 I -- I wasn't -- I wasn't thinking specifically of

1 Clean Air Act. I was just thinking of -- of the best
2 available technology as a term of art in general in
3 the engineering field.

4 THE CHAIR: Got it. Okay. Perfect.

5 COMMISSIONER AMPOMAH: Thank you,
6 Chair.

7 BY COMMISSIONER AMPOMAH:

8 COMMISSIONER AMPOMAH: So just to
9 follow up on that, I thought as part of the testing,
10 logging plan, and all of that, I thought operators
11 will propose, and then the director will more or less
12 have to sign off on those logging plans and then the
13 testing plans. Is that not what is in the current
14 rule?

15 DR. HELM-CLARK: The current rule?
16 Yes. That's what is in the current rule.

17 COMMISSIONER AMPOMAH: So even without
18 us using -- without us incorporating the using the
19 best technology available, and you've also agreed that
20 the director has to make that decision, then it sounds
21 to me that the director will have the ability to sign
22 off on the logs that the operator is proposing. Would
23 you agree with me on that?

24 DR. HELM-CLARK: My purpose was to get
25 the logs in there that I believe were missing.

1 Notably the logs that can nail the location of USDWs.
2 And as the rules are currently written, those logs are
3 missing. And that's why I'm suggesting they're
4 included.

5 COMMISSIONER AMPOMAH: Now, if we go to
6 page 15, right on the top, so you've highlighted --
7 and I'll give you a minute here. So you've
8 highlighted, what, before the cement has cure. Is
9 there not more, like, industry standard as to when --
10 yeah. Go ahead.

11 DR. HELM-CLARK: You know, they
12 could -- I -- I -- at -- at this point, you know, I
13 often see that one could drop into guidance, but it's
14 not in the rule. And if you're just reading the rule,
15 and you're not really familiar with cement, you know,
16 with -- with logging to -- to test for the competency
17 of -- of your cement bonding, you might not know this.

18 But the -- you want, you know, you --
19 you want to -- you want to set your cement. You want
20 to run your log before it's cured because when cement
21 sets, it's an exothermic reaction. If there are
22 flaws -- if there are flaws in the cement as it sets
23 up, and you've got microcracks and -- and faults that
24 are forming in the cement as it sets, it's going to
25 have a temperature peak in that temperature log

1 because of the exothermic reaction while it sets.

2 That's why you want to run it before it
3 sets. If you're running it, you know, to -- to
4 examine whether or not you've gotten, you know, a good
5 cement line.

6 COMMISSIONER AMPOMAH: Thank you. So
7 the second one, that would be C3, iii. Don't you
8 believe that that description more or less belongs to
9 a guidance than a rule?

10 DR. HELM-CLARK: I would prefer to see
11 it in the rule to tell you the truth.

12 COMMISSIONER AMPOMAH: But don't you
13 believe that is a best practice?

14 DR. HELM-CLARK: That's the way the log
15 ought to be run. What I would -- what I consider --
16 what I would consider appropriate for guidance is how
17 long you want the well to equilibrate. Because the
18 requirements for equilibrating a well before running a
19 temperature log vary by jurisdiction and by purpose.

20 COMMISSIONER AMPOMAH: Okay. Let me
21 move on quickly here. Yeah. So let's go to page 17.
22 Now, on page 17, you are requiring an actual type of
23 tools. And in the -- my question is, should the rule
24 not be more of what we are looking for? And then the
25 operator will suggest how they want to get that

1 information for the director's review, other than we
2 strictly, you know, showing the type of technology
3 that needs to be used, knowing well that these
4 technologies will be obsolete in ten years to come,
5 specifically the repeated resistivity log and the --

6 DR. HELM-CLARK: No, I don't agree. I
7 -- I don't agree with that. Twenty
8 years ago -- 20 years ago, we couldn't do this kind of
9 logging. Now, with the -- with the new resistivity
10 through casing tools, we can't. And so we should,
11 because the -- the peer review literature shows that
12 it is a good way to detect changes in groundwater from
13 infiltration by CO2.

14 COMMISSIONER AMPOMAH: Yeah. I agree
15 with you. But what I was saying is that you agree
16 with me that technology is going to evolve over time.
17 So would this not necessarily be more suitable for a
18 guidance than can be really put in the rule?

19 DR. HELM-CLARK: Well, as I said
20 before, I -- I prefer to see things in the rule.

21 COMMISSIONER AMPOMAH: Let's go to page
22 18. So on top, right at 8, you are saying that the
23 soil gas monitoring, that includes a minimum of one
24 year of background sampling. Is there a literature
25 that supports that if we do it six months, if we do it

1 two months, it's not going to be sufficient, and it
2 has to be one year?

3 DR. HELM-CLARK: The -- the research
4 that's come out of the University of Texas at Austin
5 suggests one to three years, but one is a minimum.
6 And I was relying very strongly on their research into
7 CO2 gas fluxes in soil, specifically in the context of
8 their -- they've been running -- they've been running
9 research to see how good it is for actually
10 detecting -- CO2 --

11 COMMISSIONER AMPOMAH: Thank you. Can
12 we go to page 23? And I'm looking at O, emergency and
13 remedial response. So you've highlighted what to be
14 done when there is a new microseismic event. So my
15 question is, did you reconcile this with a protocol
16 that New Mexico OC already established whenever there
17 is any microseismic events?

18 DR. HELM-CLARK: No, this was -- the --
19 the -- you're talking O. I did not address any -- I
20 did not address seismicity. I was addressing
21 catastrophic CO2 release accident.

22 COMMISSIONER AMPOMAH: Okay. So you're
23 saying that this plan shall include procedures to
24 temporarily cease injection and to inspect wells and
25 well infrastructure --

1 DR. HELM-CLARK: Oh, I -- I'm sorry. I
2 was -- I was looking at part 2, not part 1. I -- I
3 apologize.

4 COMMISSIONER AMPOMAH: Okay. So can
5 I -- do you want me to repeat the question one more
6 time?

7 DR. HELM-CLARK: Please repeat the
8 question. I thought we were in the paragraph below.
9 My apologies.

10 COMMISSIONER AMPOMAH: No problem. So
11 I'm asking, did you review the New Mexico OCD's
12 protocol whenever there is any microseismic events
13 happening at the injection site or production site?
14 Do you reconcile --

15 DR. HELM-CLARK: At the time that I --
16 at -- at the time that I wrote this, I was not aware
17 of OCD's protocol. Since I wrote this, I have become
18 aware of OCD's protocol. And had I been aware of it,
19 I might have changed this.

20 I actually like using the modified
21 Mercalli scale because it -- it's -- it's an actual
22 number of damage on the ground as opposed to a
23 magnitude. It's as simple as that. It's a
24 preference.

25 I -- I don't think OCD's size of the

1 protocol is unreasonable. Actually, I rather like it.
2 And if you wanted to say, oh, yeah, let's defer to our
3 already existing protocol, I certainly wouldn't argue
4 with that. I didn't realize you had that when I wrote
5 this.

6 COMMISSIONER AMPOMAH: Thank you. Now,
7 so let's go to the paragraph 2 now. Let's go to the
8 paragraph 2 now. So --

9 DR. HELM-CLARK: -- the one -- the one
10 that I thought you were on.

11 COMMISSIONER AMPOMAH: Exactly.
12 Exactly. So you're talking about re-mandating
13 training and necessary equipment for local emergency
14 responders shall be provided on annual basis unless a
15 community request for it to be provided more frequent.

16 So my question to you is, how is that
17 going to be coordinated when you have multiple
18 operators operating in a particular setting?

19 DR. HELM-CLARK: Every single -- every
20 single public -- every single police department and
21 fire department is doing annual training already.
22 It's a requirement either underneath -- it's a
23 requirement either under OSHA 29 C.F.R. 1910.120, or
24 it's a requirement under EPA 40 C.F.R. 311. The --
25 the statutes basically are identical.

1 It's just the EPA instituted it -- its
2 own so that they could cover volunteer firemen. In
3 that statute, you have -- you have to have a huge
4 chunk of training upfront to -- to respond to
5 hazardous materials emergencies. And you must every
6 year retrain.

7 That's on top of the regular
8 firefighting and -- and police annual training. So
9 what you're doing in this -- but the section that I
10 dropped in here is essentially what I use as a lesson
11 plan. And I hand this to my fire department or my --
12 my hazmat crew or my police department and say,
13 "Please include this in your annual hazardous
14 materials refresher training."

15 And that should cover it because
16 they're already training for these things every year
17 anyway. Just drop it into what they're already doing.
18 It'd probably be a 15-minute module. Take care of it.
19 And then they're acquainted with the accident, and --
20 and they'll have the knowledge.

21 You know, what happened in Satartia --
22 Satartia, Mississippi, the -- the first responders had
23 no idea what a CO2 large release accident looked like.
24 When they approached the accident, they had no idea
25 what they were looking at. They had no way to

1 evaluate it.

2 They -- and -- and I'm not even sure
3 they were aware that they had a CO2 pipeline in the
4 neighborhood when they were responding. You -- you
5 have, you know, you basically, you've got to -- you've
6 got to inform your -- your emergency first responders
7 that these accidents can happen and then, you know,
8 tell them it's there, give them materials, let them
9 know they're training like usual. It -- it should be
10 a no-brainer.

11 COMMISSIONER AMPOMAH: Yeah, it should
12 not. But who is responsible for that?

13 DR. HELM-CLARK: I'm not sure -- So
14 responsible for what? Who's responsible for -- every
15 fire department, every police department, all first
16 responders have to have this training by federal
17 statute. This rule and the equivalent EPA Class VI
18 rules say that -- that the operator or the owner will
19 provide training to those local emergency response
20 people. So you have --

21 COMMISSIONER AMPOMAH: Yeah. So I'm
22 asking you --

23 DR. HELM-CLARK: -- operator
24 responsible for providing the information to the first
25 responders so that they can do the appropriate thing.

1 COMMISSIONER AMPOMAH: Exactly. So I'm
2 asking you, in a particular area, you have multiple
3 Class VI projects in that area. So I'm asking you,
4 from what we have in the rule, how is that going to be
5 coordinated and still be able to more or less meet
6 this value?

7 DR. HELM-CLARK: Every owner and
8 operator should be talking to their fire marshal and
9 then their police department that they've got, you
10 know, a Class VI project in the process and that these
11 are the hazards that these projects can present to a
12 community.

13 This actually happens all the time with
14 almost every single industrial plant and -- and
15 installation that I've run into. People are always
16 talking to their fire marshal and say: "Hey, this is
17 what we've got on site. These are our hazards."

18 COMMISSIONER AMPOMAH: Yeah. So some
19 few additional questions for you. So it's not like
20 you like the idea of third-party review; is that
21 correct?

22 DR. HELM-CLARK: I like the what
23 review?

24 COMMISSIONER AMPOMAH: The third party.
25 Yeah. The third-party review on the applications.

1 Mostly departments that --

2 DR. HELM-CLARK: -- party review?

3 COMMISSIONER AMPOMAH: The permit
4 application review. Do you support a third party
5 review of, let's say, the models that would be
6 submitted as part of the application? So I'm moving
7 from the rule right now, and I'm asking you a
8 different question.

9 DR. HELM-CLARK: Okay. Yeah. At what
10 point during the review process?

11 COMMISSIONER AMPOMAH: So I'm asking
12 you, are you in favor of, let's say, a third party
13 reviewing the applications instead of, let's say, OCD
14 reviewing the applications?

15 DR. HELM-CLARK: I believe there should
16 be a public review of applications.

17 COMMISSIONER AMPOMAH: Public review of
18 the application. At what point, considering
19 confidential business information?

20 DR. HELM-CLARK: Are you asking me
21 about who should be -- who should be allowed to view
22 proprietary business information?

23 COMMISSIONER AMPOMAH: No. I think you
24 directed the question though with the response. So I
25 was asking you, are you in support of OCD using

1 independent third-party reviewers of the submitted
2 applications?

3 DR. HELM-CLARK: Oh, to aid -- to aid
4 OCD's own review of --

5 COMMISSIONER AMPOMAH: Exactly.

6 DR. HELM-CLARK: Yes.

7 COMMISSIONER AMPOMAH: Okay. Now, let
8 me ask you. So in case there is, let's say, a
9 conflict, disagreement between OCD's own internal
10 review, EPA's, guidance or rule, and then the third-
11 party reviewer, who makes the final decision?

12 DR. HELM-CLARK: It should be the
13 Division. But, you know, that's -- that's a legal
14 thing. That's up to you guys. If -- if --

15 COMMISSIONER AMPOMAH: Oh, please go
16 ahead.

17 DR. HELM-CLARK: No, no, no, no. It
18 would -- it was a tangential comment. Let's keep
19 going.

20 COMMISSIONER AMPOMAH: Okay. Now, so
21 you you've recommended several provisions that we went
22 through as part of, let's say, the rule. You want us
23 to implement this rule. Now, there are other states
24 that do have primacy. Did you check to see if any of
25 these primacy states incorporated any of these

1 provisions that you are suggesting to the Commission
2 into their rule?

3 DR. HELM-CLARK: I'd have to look at my
4 list.

5 COMMISSIONER AMPOMAH: Okay.

6 DR. HELM-CLARK: You know, I'm going to
7 have to say right off the top of my head, I'd have to
8 go back and look at all of the different rules. I
9 know that there were some -- some significant
10 deviations in -- in North Dakota's rules, but I'm
11 going to say right -- right now, off the top of my
12 head, I don't know.

13 COMMISSIONER AMPOMAH: Okay.

14 DR. HELM-CLARK: I'd have to go
15 through --

16 COMMISSIONER AMPOMAH: Okay. Thank
17 you. So my last question to you, so did you also have
18 issues with OCD staffing levels?

19 DR. HELM-CLARK: No.

20 COMMISSIONER AMPOMAH: Okay. Then I'm
21 going to end here. Thanks so much for your testimony,
22 and I do appreciate that. Thank you.

23 THE HEARING EXAMINER: Thank you,
24 Commissioner Ampomah.

25 DR. HELM-CLARK: Thank you.

1 THE HEARING EXAMINER: Commissioner
2 Czoski, do you have questions of Dr. Helm-Clark?

3 COMMISSIONER CZOSKI: Yes, I do.

4 THE HEARING EXAMINER: Okay.

5 EXAMINATION

6 BY COMMISSIONER CZOSKI:

7 COMMISSIONER CZOSKI: Hello,
8 Dr. Helm-Clark. Thank you for your time today. So
9 I'm going to start off kind of going through your
10 presentation and ask some questions built off that.

11 DR. HELM-CLARK: All righty.

12 COMMISSIONER CZOSKI: So I have a few
13 questions about the executive summary. And when you
14 say that applicant simply followed the EPA checklist,
15 can you elaborate a little bit more on that, please?

16 DR. HELM-CLARK: Oh. No, I wish I
17 could remember where this checklist comes from, but
18 I -- I -- I've seen it in multiple applications.
19 There's a checklist, and it's got -- it's a list of
20 everything that the -- the EPA wants to see in a
21 permit.

22 It may actually be based off of their
23 forms that they like people to use, but it's -- it's
24 the same list. I see it over and over again. And
25 that's what I'm referring to.

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1 And, I mean, basically, it's -- it's
2 just a checklist. You know, we want to see, you know,
3 we want to see your well logging. We want to see
4 where you're going to collect for. We want to see,
5 you know, if it's -- how you've done your -- your site
6 characterization. It's basically just a list of
7 requirements.

8 COMMISSIONER CZOSKI: Okay. Thank you.
9 In your experience reviewing these Class VI permits,
10 do applicants often need to go back and collect
11 additional data in order to ensure that the permit can
12 be approved?

13 DR. HELM-CLARK: I can't speak to that.
14 I -- I -- I'm usually seeing the permit after the
15 permit's been finalized and submitted. So if -- if a
16 permittee has put a permit in, and they've got missing
17 information, and -- and a -- a state or the EPA has
18 said, "We want to see more information on this topic,"
19 that's completely okay.

20 COMMISSIONER CZOSKI: Okay. Thank you
21 for that clarification. So I want to talk a little
22 bit more about some of the well investigations. So
23 would it surprise you to hear that there was recently
24 a leak, a fluid leak, from a well in Southeastern New
25 Mexico that was plugged sometime in the 1950s?

1 DR. HELM-CLARK: Would I be surprised
2 if there was a leak out of a plugged well that was
3 plugged in the 1950s? I wouldn't be surprised at all.

4 COMMISSIONER CZOSKI: Okay. Thank you.
5 And if so, if you were looking at a permit, and there
6 was -- let's say there was a well in your area of
7 review similar to this, say, from the 1950s, and
8 there's no other well plugging information of how it
9 was plugged and where it was plugged, how would you
10 deal with that concern when reviewing these permits?

11 DR. HELM-CLARK: I would target that
12 well as being something that needed to be corrected.

13 COMMISSIONER CZOSKI: And how would you
14 suggest that be corrected?

15 DR. HELM-CLARK: I would suggest the
16 well be plugged.

17 COMMISSIONER CZOSKI: Is there any
18 other log -- is there logging they could do to check
19 the integrity of the well for permitting?

20 DR. HELM-CLARK: If it's an old well
21 that's already been plugged, it -- it's going to have
22 at -- at least, you know, it's going to -- it -- it's
23 going to have a cement slug on the top, and who knows
24 what's on the bottom. You -- you might have to
25 actually drill out old drilling mud or whatever the

1 they stuff down the well to plug it in -- in order to
2 plug, you know, that it -- it's -- it's not -- it's
3 not a simple problem. There -- there's no -- there's
4 no magic word here.

5 COMMISSIONER CZOSKI: Yeah. Thank you
6 for that. So at what point in the permitting process,
7 in your experience, would this need to occur?

8 DR. HELM-CLARK: You'd have to get all
9 of these wells corrected. For the -- for the ones
10 that you've identified for correction, they need to be
11 fixed before you start again.

12 COMMISSIONER CZOSKI: Okay. And on
13 your slide here, you said that there was
14 contaminated -- there's contamination into a
15 tributary. I was just wondering if you could go a
16 little bit more into detail about that contamination.

17 DR. HELM-CLARK: Lake Veto didn't exist
18 until, I believe, after World War II, when they filled
19 it up. When they filled it up, they -- they used
20 eminent domain to contaminate property -- property
21 around the -- the lake that they formed.

22 Part of that -- part of that property
23 that was taken by eminent domain was part of a farm
24 belonging to a family that's owned that property for
25 well over 100 years.

1 The -- in the 1930s, the farmer of that
2 property, because it -- it was, you know, it was big -
3 - big oil time in Appalachia, brought in -- brought in
4 a drill rig and drilled -- and drilled, you know, a --
5 a series of wells on the farm, like everybody else was
6 doing in the neighborhood.

7 I don't even know if any of those wells
8 went into production. I believe they drilled four
9 wells on that property. They -- they were all
10 undocumented.

11 When -- when Redbird No. 4 went -- went
12 live, and I believe it went live in -- I may be off by
13 one or two years -- I believe it went live in 2017.
14 In the next year, things started happening around that
15 Class II well, one of which is gas wells completed in
16 a production level, and I believe it was 2,000 feet
17 higher than the injection level, started -- started
18 getting destroyed by infiltration by -- by rock.

19 And at first, it was just a handful of
20 wells and eventually became 28 wells. That -- the --
21 the disposition and the damages for those wells is --
22 is a court case that's currently going to the courts
23 in Ohio.

24 The -- the well that was originally --
25 the -- the well that did the discharge of the

1 tributary is actually, when it was originally drilled,
2 it was on dry land. When they filled the reservoir,
3 it became a creek. So that abandoned well was
4 actually in the bed of the creek.

5 And what was observed by people using
6 the lake was -- was the contamination of the brine
7 and -- and some -- and -- and petroleum products that
8 were getting into this tributary and getting into the
9 lake.

10 And that's how they actually discovered
11 the -- the initial problems with that well or the
12 releases from this abandoned, undocumented well.
13 Would you like more details? There's -- there's
14 actually -- there's actually two reports that are out
15 on the Ohio DNR site that discuss this in great
16 detail.

17 COMMISSIONER CZOSKI: Okay. Yeah.
18 Thank you for elaborating on that. And so that well
19 that was leaking inside of the lake, you said that
20 there was no documentation of that and -- correct?

21 DR. HELM-CLARK: Yeah. There was no
22 documentation of that in Ohio's oil and gas well
23 database. They discovered that the family knew about
24 it because when it started discharging -- I don't know
25 if the DNR interviewed them or if they came up and

1 said, "Oh yeah, our grandfather drilled that well."
2 But it was discovered that the land -- the original
3 landowners had the knowledge that those wells had been
4 drilled.

5 COMMISSIONER CZOSKI: Okay. Thank you.
6 And do you have any idea how many undocumented wells
7 could be in an area that has oil and gas development?

8 DR. HELM-CLARK: Your guess is as good
9 as mine.

10 COMMISSIONER CZOSKI: Yeah.

11 DR. HELM-CLARK: Yeah. I -- I suspect
12 that in the developed fields, we actually have a
13 better idea, especially the ones that are still
14 producing, even old fields that have not been -- that
15 have not been subject to production for many years or
16 places where people have just wildcatted, those are
17 the ones I really worry about.

18 And of course, these really, really old
19 wells that people drilled, like, in the '20s and '30s
20 and never documented, they're -- they're a big
21 problem.

22 COMMISSIONER CZOSKI: Yeah. U.S. has a
23 long history of oil and gas development.

24 DR. HELM-CLARK: There'd have to be
25 tens of thousands. I mean, I -- I forget what the

1 national estimate is, but it's very sobering. In a
2 way, if you think about it, we don't have a -- with
3 Class VI, we don't have an AOR problem or a fault
4 problem. What we really have is an abandoned well
5 problem.

6 COMMISSIONER CZOSKI: Thank you. So
7 there was some discussion that AORs could be larger
8 than 10 miles. And I was wondering if instead of
9 maybe having a fixed radius, if there'd be some kind
10 of additional buffer that you could suggest or in your
11 expertise, so if it was -- if there was an AOR that
12 was 10 miles, you know, how -- should there be an
13 extra certain buffer put on whatever area the AOR is
14 so it's not a complete fixed distance?

15 DR. HELM-CLARK: I don't know. I
16 got -- I -- I -- I I'd really have to mull that one
17 over. You know, the -- the largest AOR that I know of
18 is 2 miles. And that's ADM's. And ADM has been
19 running, what, since 2007. They ran, I believe, in
20 2007 and then 2014.

21 Then they took a -- then they took a
22 break, and they -- and they started injecting again in
23 2017. I think in the United States, they're the ones
24 who have injected the most CO2. And they're just 2
25 miles.

1 I think Sleipner is about four. But
2 Sleipner is -- is injecting into a signal -- that --
3 that's Sleipner in Norway, if you're not familiar with
4 the project. I believe Sleipner is around four. I
5 think that's the largest one I've heard about it.

6 COMMISSIONER CZOSKI: Okay. Yeah.
7 Thank you.

8 DR. HELM-CLARK: If it was 10 miles,
9 I -- I just have -- if it was really as big as 10
10 miles, geez. I -- I think -- I think I would -- I --
11 I think I would -- I think I'd recommend that you look
12 at schools and public buildings 10 miles from the
13 periphery of -- of that AOR. It seems extreme,
14 though. I mean, that -- that -- that's a huge area.

15 COMMISSIONER CZOSKI: Okay. Yeah.
16 Thank you for that. So in the rule as it's written
17 now, it mentions that only faults that could transect
18 the confining zone need to be included in the AOR.
19 And I was wondering if you agree with that or if you
20 think that all faults dependent on where they are in
21 relation to the injunction and confinement zone should
22 be mapped?

23 DR. HELM-CLARK: I think all faults
24 should be mapped.

25 COMMISSIONER CZOSKI: Okay. Thank you.

1 And, I guess, why do you think that?

2 DR. HELM-CLARK: Because I think we're
3 missing details. We, you know, I -- as I said before,
4 we -- we only have limited ways to map the subsurface.
5 And even -- even if you do your single best job of
6 trying to map all the faults in the subsurface, you
7 could have missed something.

8 And -- and very often, especially with
9 the induced seismicity, you're going down instead of
10 up. And -- and you're exploiting faults in the
11 crystalline basement that then communicate to, you
12 know, could -- can communicate to other faults or to
13 wells.

14 So I -- I think limiting it to the --
15 to the -- the confining zones and the injection zone
16 is too narrow. I want to know where every single
17 fault was because one of those faults actually could
18 end up being a transmissive fault that leads to a
19 discharge outside of the AOR.

20 COMMISSIONER CZOSKI: Okay. Thank you
21 for sharing that. And have you ever in your
22 experience reviewing Class VI permits, have you ever
23 looked at one that didn't have 3D seismic?

24 DR. HELM-CLARK: Yes. And I screamed
25 "Bloody hell" because I didn't like it.

1 COMMISSIONER CZOSKI: How did they --

2 DR. HELM-CLARK: That -- that was --
3 the last -- permit and -- and -- oh, don't get me
4 started.

5 COMMISSIONER CZOSKI: How did they
6 support that there were no faults in the area if they
7 didn't have any mapping?

8 DR. HELM-CLARK: Well, maybe I
9 shouldn't say they didn't have any mapping. What that
10 permit had was pages and pages and pages of seismic
11 sections that were totally blacked out.

12 They showed -- they showed three
13 seismic sections to the west of the proposed injection
14 site where there were no other wells, no well logs, no
15 core, no nothing, just three 2D seismic lines. And
16 they made their case that they, you know, had an area
17 that was sufficiently unfaulted, that it wasn't a
18 problem.

19 We screamed "bloody hell" in that
20 permit review. I -- I think having three 2D seismic
21 lines on the entire west side of an AOR is utterly
22 inadequate. I called it a data desert. I don't -- I
23 didn't think their permit was justifiable.

24 Oh, their stratigraphic well was 6
25 miles away from their injection well in -- in deltaic

1 in, you know, in a deltaic progressive environment.
2 And -- and you know how quickly things can -- can
3 shift laterally in those kinds of environment. Yet
4 there stratigraphic well was 6 miles by any other
5 direction to the east. I just -- oh, don't get me
6 started. I'll stop.

7 COMMISSIONER CZOSKI: Thank you for
8 sharing your experience with that. So do you think
9 that 3D seismic should be required? And I know you
10 went over some examples where that might not be the
11 best tool, but --

12 DR. HELM-CLARK: I'm in favor of any
13 geophysical method that can give you a really great
14 picture. Usually that's 3D seismic. But as I said,
15 if -- if we're getting into the Rio Grande Rift here,
16 and we're looking at, you know, and -- and we're
17 looking at trying to do seismic through those --
18 layers of basalt, you've got a problem.

19 COMMISSIONER CZOSKI: So do you think
20 such, like, gravity surveys could maybe be used to
21 help map structures?

22 DR. HELM-CLARK: Well, gravity --
23 gravity is kind of coarse, especially if you're trying
24 to see details that are very deep. Gravity -- gravity
25 isn't going to help you that much.

1 Neither is, you know, really, seismic
2 is the go-to thing. And -- and if you can't do 3D
3 seismic or you can't collect the five -- five billion
4 2D seismic lines, and then, you know, you're -- you're
5 looking at going to a, well, ambient, you know,
6 ambient noise tomography seismic methods instead.

7 You've got to be using some kind of
8 seismic method. There's really no other way to find
9 faults besides pincushioning the ground with a billion
10 holes and -- and making a, you know, detailed
11 stratigraphic section. You know, just -- seismic is
12 the name of the game.

13 COMMISSIONER CZOSKI: So I have more
14 questions about ambient noise tomography, but we can
15 wait till tomorrow, you know. We you need to break
16 soon, so --

17 DR. HELM-CLARK: Oh, wow. It's late.
18 Sorry. Didn't mean to be -- didn't mean to be so long
19 on the tooth in talking.

20 COMMISSIONER CZOSKI: No, I appreciate
21 you sharing your experiences.

22 DR. HELM-CLARK: Okay.

23 THE HEARING EXAMINER: All right.
24 Let's break for the afternoon. We'll resume at nine
25 with public comment and then return to Dr.

1 Helm-Clark's questioning. Thank you.

2 MR. TUCKER: Madam Hearing Officer?

3 THE HEARING EXAMINER: Yes.

4 MR. TUCKER: Before we break, could we
5 just discuss scheduling tomorrow real briefly?

6 THE HEARING EXAMINER: Yes. Go ahead.

7 MR. TUCKER: So discussing scheduling
8 tomorrow with the other parties in the room, Oxy's
9 witness, Caroline Wachtman, has traveled to Santa Fe
10 from out of state to provide testimony in person.

11 We'd like to request a slight change to
12 the order of presentation to allow Ms. Wachtman to
13 testify tomorrow so she doesn't have to extend her
14 travel or book a second flight.

15 I've spoken with the parties in the
16 room, and they graciously agreed to change the order
17 of presentation -- put the parties on the platform, so
18 we need to give them a chance to weigh in.

19 But specifically, we'd like to have
20 WELC's witness, Peter Morgan, go first as scheduled,
21 and then have Oxy's panel go next, and then take up
22 WELC's witness, Dr. Harvey, afterwards, if the hearing
23 officer and Commission are amenable to that.

24 THE HEARING EXAMINER: All right. Let
25 me pause for a moment in the event there's anyone on

1 the platform with an observation about that.

2 MR. PAVLIK: I think that's fine with
3 us. As long as Dr. Helm-Clark can finish in the
4 morning, that sounds great.

5 THE HEARING EXAMINER: All right.
6 Anything else? All right.

7 Well, thank you very much, Mr. Tucker
8 and Ms. O'Grady. We will proceed with the plan you
9 described.

10 MR. TUCKER: Thank you very much.

11 THE HEARING EXAMINER: Thank you.

12 (Whereupon, at 2:49 p.m., the
13 proceeding was concluded.)

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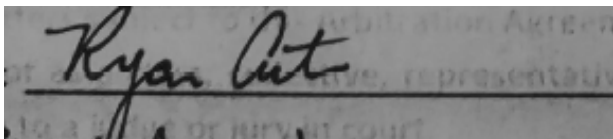
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CERTIFICATE

I, RYAN AUTEN, the officer before whom the foregoing proceedings were taken, do hereby certify that any witness(es) in the foregoing proceedings, prior to testifying, were duly sworn; that the proceedings were recorded by me and thereafter reduced to typewriting by a qualified transcriptionist; that said digital audio recording of said proceedings are a true and accurate record to the best of my knowledge, skills, and ability; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this was taken; and, further, that I am not a relative or employee of any counsel or attorney employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

A rectangular box containing a handwritten signature in black ink. The signature appears to read "Ryan Auten". The background of the box is a light gray, and there are some faint, illegible markings visible behind the signature.

RYAN AUTEN
Notary Public in and for the
State of New Mexico

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CERTIFICATE OF TRANSCRIBER

I, KATHLEEN ALCORN, do hereby certify that this transcript was prepared from the digital audio recording of the foregoing proceeding, that said transcript is a true and accurate record of the proceedings to the best of my knowledge, skills, and ability; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this was taken; and, further, that I am not a relative or employee of any counsel or attorney employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.



KATHLEEN ALCORN

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