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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 Nos. 25875

EVIDENTIARY RULEMAKING HEARING FOR THE ADOPTION OF
19.15.41, 19.15.42, AND 19.15.43 NMAC - DAY 6
DATE: Monday, August 3, 2026
TIME: 9:07 a.m.
BEFORE: Hearing Officer Felicia Orth
LOCATION: Wendell Chino Building, Pecos Hall
1220 South Saint Francis Drive
Santa Fe, NM 87505
REPORTED BY: Gerald Aragon
JOB NO.: 8347080

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

Saraswati Khalsa, Public Commenter (by
videoconference)

Dr. William Ampomah, Commissioner, New Mexico Oil
Conservation Commission

Paige Czoski, Commissioner, New Mexico Oil
Conservation Commission

Sheila Apodaca, Law Clerk, New Mexico Energy,
Mineral and Natural Resources Department

Dr. Charles Harvey, Expert Witness, Conservation
Groups (by videoconference)

Albert C.S. Chang, Commission Chair

Zachary Shandler, Commission Counsel

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I N D E X

PAGE

OPENING STATEMENT By Ms. Gutierrez 1377

WITNESS (ES) : DX CX RDX RCX

DR. CHARLES HARVEY

By Ms. O'Grady 1199 1323

By Mr. Tucker 1283

By Mr. Tremaine 1303

By Mr. Ampomah 1325

By Ms. Czoski 1358

1	E X H I B I T S		
2	NO.	DESCRIPTION	ID/EVD
3	Case 25875:		
4	Exhibit 1	Proposed Amendments	1282/1282
5	Exhibit 1-A	Proposed Amendments to	
6		19.15.41 NMAC	1329
7	Exhibit 1-C	Proposed Amendments to	
8		19.15.43 NMAC	1334
9	Exhibit 2	Resume of Peter Morgan	1282/1282
10	Exhibit 3	Direct Testimony of Peter	
11		Morgan	1282/1282
12	Exhibit 4	Resume of Charles Harvey, PhD	1282/1282
13	Exhibit 5	Direct Testimony of Charles	
14		Harvey, PhD	1282/1282
15	Exhibit 6	Bukar Report	1282/1282
16	Exhibit 7	Burton-Kelly Report	1282/1282
17	Exhibit 8	Carroll Report	1282/1282
18	Exhibit 9	Cavanagh Report	1282/1282
19	Exhibit 10	Chen Report	1282/1282
20	Exhibit 11	Choi Report	1282/1282
21	Exhibit 12	Crain Report	1282/1282
22	Exhibit 13	Gholami Report	1282/1282
23	Exhibit 14	Jahan Report	1282/1282
24	Exhibit 15	Langenbruch Report	1282/1282
25	Exhibit 16	Pan Report	1282/1282

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E X H I B I T S (Cont'd)

NO.	DESCRIPTION	ID/EVD
Exhibit 17	Saló-Salgado Report	1282/1282
Exhibit 18	Snider Article	1282/1282
Exhibit 19	Sun Report	1282/1282
Exhibit 20	Tian Report	1282/1282
Exhibit 21	White Report	1282/1282
Exhibit 22	Zoback Report CG-434	1282/1282
Exhibit 23	Zoback Report CG-440	1282/1282
Exhibit 24	Rebuttal Testimony of Peter Morgan, J.D.	1282/1282
Exhibit 25	Rebuttal Testimony of Charles Harvey, PhD	1282/1282

1 P R O C E E D I N G S

2 THE HEARING OFFICER: Good morning. We
3 are going to begin this morning. This is the sixth
4 day in OCC 25875. We are beginning, let's see, eight
5 minutes late. We were evacuated from the building,
6 short 449 for a fire marshal visit -- a routine fire
7 marshal visit.

8 Let me ask -- I believe I recognize
9 everyone in the room, but this is a sixth opportunity
10 for public comment.

11 Sheila, is there anyone on the
12 platform?

13 MS. APODACA: I am not seeing any hands
14 raised and there was nobody signed up.

15 THE HEARING OFFICER: Okay. Let me
16 offer one thing. Sheila had made arrangements for
17 simultaneous interpretation between English and
18 Spanish, and Spanish and English, for the public
19 comment opportunity both tomorrow morning, August 4th,
20 and also Friday morning, August 7th.

21 We may finish today. Regardless of
22 whether we do finish today, however, we will be on the
23 platform to invite public comment in the event someone
24 had made plans to offer it in the morning and desired
25 Spanish interpretation. I cannot imagine that we will

1 come anywhere near Friday. So please assume that
2 tomorrow morning will be the last opportunity to offer
3 comment, either in English or in Spanish.

4 It looks like we have Saraswati Khalsa
5 on the platform. Can you unmute yourself?

6 MS. KHALSA: Hello?

7 THE HEARING OFFICER: Oh, yes. Hello.
8 Would you spell your first and last name, please?

9 MS. KHALSA: Yes. Saraswati. It's S-
10 A-R-A-S-W-A-T-I. That's my first name. My last name
11 is Khalsa, K-H-A-L-S-A.

12 WHEREUPON,

13 SARASWATI KHALSA,
14 called as a witness and having been first duly sworn
15 to tell the truth, the whole truth, and nothing but
16 the truth, was examined and testified as follows:

17 THE HEARING OFFICER: Thank you. Go
18 ahead.

19 MS. KHALSA: Good morning. My name is
20 Saraswati Khalsa, and I live in Española. You might
21 remember that, in November last year, the WQCC voted
22 to rescind its decision to revisit the rule
23 prohibiting discharge of treated produced water,
24 because the vote to allow a new hearing had been
25 tainted by the actions of the governor's office.

1 It was revealed by a reporter that the
2 governor's office instructed her agency heads to sit
3 personally on the WQCC and get this over the finish
4 line. And that is what they tried to do, until a
5 journalist and the public called them out, and the
6 WQCC was forced to backtrack.

7 Now, we learn that the governor is
8 again interfering in the regulatory process, in
9 service of the oil and gas industry. In an e-mail
10 written on July 8, 2025, Jennifer Raney from New
11 Mexico Tech sent an e-mail to two folks at G&K, Dalva
12 Moellenberg and Anthony Trujillo, copied to Justin
13 Wrinkle and Jesse Tremaine of --

14 MR. TREMAINE: Madam Hearing Officer,
15 this is a -- I'm going to interject here and object.
16 She's referring to attorney-client privileged
17 communication. If I am on the e-mail and Dalva
18 Moellenberg is on the e-mail, this is an attorney
19 communication between our contractor and counsel.

20 THE HEARING OFFICER: Okay.

21 MR. TREMAINE: I have no idea who this
22 is, or how she got ahold of this e-mail.

23 THE HEARING OFFICER: Yeah.

24 Ms. Khalsa, New Mexico does --

25 MS. KHALSA: Yeah.

1 THE HEARING OFFICER: -- recognize
2 attorney-client privilege. Do you have something else
3 to say?

4 MS. KHALSA: This was -- this was
5 obtained via IPRA. So it's an open government record,
6 as far as I know.

7 THE HEARING OFFICER: From whom did you
8 IPRA it?

9 MS. KHALSA: It was sent to me by Colin
10 Cox, with Center for Biological Diversity, and they
11 obtained it by IPRA.

12 MR. TREMAINE: I will need to see --
13 Madam Hearing Officer, I would need to see the
14 document that they're referring to. There are some
15 documents that have been produced in response to
16 various IPRA requests that do include -- that do
17 include us.

18 However, speaking to the content of
19 that -- the content of an internal e-mail in the form
20 of public comment, I am going to renew my objection
21 that this is very into technical testimony. However,
22 obviously I'm unaware of the specific e-mail -- that
23 content. The nature of the public comment is
24 concerning.

25 THE HEARING OFFICER: Yeah.

1 Mr. Chair, do you have an opinion here
2 as to how to proceed?

3 MR. CHANG: I'm happy to let Commission
4 Counsel also weigh in here. Certainly, public
5 comment, I'm not sure what the -- what the procedures
6 are here for objecting to public comment, given that
7 it's public comment.

8 And public comment is -- yeah, I'm not
9 sure that I have -- I'm not sure that I have an
10 opinion formed at the moment as to how public comment
11 and attorney-client privilege intersects.

12 THE HEARING OFFICER: Mr. Shandler?

13 MR. SHANDLER: Madam Hearing Officer,
14 Mr. Chair, the representation is this was a public
15 document that was provided. So if that's the
16 representation, then it's public comment could be made
17 on a publicly-released copy.

18 THE HEARING OFFICER: All right. Thank
19 you both.

20 Ms. Khalsa, go ahead.

21 MS. KHALSA: Thank you very much. So
22 the heart of the e-mail, which was obtained by this
23 IPRA, reads "Dal and TJ, the time has arrived where we
24 require G&K's legal expertise for the Class VI primacy
25 rulemaking package that New Mexico plans to submit to

1 EPA Region 6.

2 We have planned to submit the draft
3 version of the crosswalk and the rules next week, but
4 there are immediate concerns that these proposed rules
5 will need to be approved and heavily modified, by both
6 WQCC and OCC before we arrive at a comprehensive
7 package. And that could set us back up to six months
8 or more.

9 Seeing as the governor's office would
10 like to expedite this process as much as possible,
11 we'd like to honor her request to run this through the
12 OCC only, and would welcome any creative solutions
13 from your end that support an approval process that
14 does not also burden the WQCC board.

15 In light of this, OCD is requesting a
16 memo from G&K that describes the proposed rules,
17 incorporates all various CO2 waste streams beyond oil
18 and gas, and why/how, if existing statutes justify the
19 Class VI program falling under the umbrella of OCD.
20 Are you available today, or any other day this week,
21 to speak with Jesse and Justin about this?"

22 So it appears to me that GNK did find a
23 creative solution so that the WQCC wouldn't be
24 burdened, just as Governor and OCD requested. Much
25 like the produced water debacle, this rulemaking is

1 now tainted by the governor's influence, and the naked
2 bias revealed by the efforts of OCD to avoid a review
3 by the Water Quality Control Commission.

4 The public has been betrayed by this
5 administration once again, and our water and health
6 put at risk for the benefit of the oil and gas
7 industry and their pursuit of a false climate
8 solution -- carbon capture -- that has been proven
9 time and again a dangerous distraction from taking
10 real action to stop the combustion of fossil fuels
11 before the whole world is on fire.

12 This rulemaking, too, is tainted and
13 must be thrown out. I will submit this comment, along
14 with a copy of the e-mail as a written comment as well
15 to the e-mail provided in the notice. Thank you.

16 THE HEARING OFFICER: Thank you,
17 Ms. Khalsa.

18 Sheila, is there anyone else on the
19 platform who'd like to offer public comment?

20 MS. APODACA: I don't see any other
21 counters raised.

22 THE HEARING OFFICER: All right.
23 Again, there will be one more opportunity, an
24 opportunity supported by an interpreter tomorrow
25 morning, August 4th at 9 a.m.

1 Now, let's return then to the technical
2 case. Are there any preliminary matters before we
3 hear Dr. Harvey's testimony? No? All right. Let's
4 go to Dr. Harvey.

5 MS. O'GRADY: Thank you, Madam Hearing
6 Officer.

7 Dr. Harvey, can we have you turn on
8 your video? And I may need just a moment as my co-
9 counsel, Rose Rushing, is changing her permissions to
10 allow screen sharing as she's going to be running our
11 slides this morning. And, Dr. Harvey, we can see you
12 bright and clear. Thank you so much.

13 THE HEARING OFFICER: You do need to
14 unmute yourself.

15 DR. HARVEY: Okay. Can you hear me
16 now?

17 THE HEARING OFFICER: Yes. Thank you.
18 Would you spell your first and last name, please?

19 DR. HARVEY: Charles, C-H-A-R-L-E-S,
20 Harvey, H-A-R-V-E-Y.

21 WHEREUPON,

22 CHARLES HARVEY,
23 called as a witness and having been first duly sworn
24 to tell the truth, the whole truth, and nothing but
25 the truth, was examined and testified as follows:

1 THE HEARING OFFICER: Thank you.

2 Go ahead, Ms. O'Grady, whenever you're
3 ready.

4 MS. O'GRADY: Thank you. We're almost
5 done. Okay.

6 Please state your name.

7 THE WITNESS: Charles Harvey.

8 MS. O'GRADY: Where are you employed
9 and what is your position?

10 THE WITNESS: I am a professor of
11 Massachusetts Institute of Technology, MIT, in
12 Cambridge, Massachusetts.

13 MS. O'GRADY: What is your educational
14 background?

15 THE WITNESS: I have a bachelor's
16 degree in math from Oberlin College, and a -- both a
17 master's and a PhD from the School of Earth Science at
18 Stanford University.

19 MS. O'GRADY: Would you please
20 summarize your work experience background?

21 THE WITNESS: In the late '80s, I
22 worked for the US Geological Survey. And then after
23 graduating from Stanford, I joined the faculty at
24 Harvard University. And then I moved to MIT, where
25 I've had a faculty position for 27 years in the

1 Department of Civil Environmental Engineering.

2 I've also worked as a consultant across
3 a variety of hydrogeologic issues. Of most relevance
4 here, I consulted for five years with C12, a startup
5 carbon capture -- CCS -- company that my former
6 postdoc, Kurt House, founded in 2008. And C12 is
7 likely the first independent CCS company that
8 pioneered the design and unitization of CCS storage
9 sites.

10 MS. O'GRADY: Could you summarize your
11 research focus as it relates to subsurface flow,
12 geologic carbon sequestration, and the behavior of
13 carbon dioxide or CO2 plumes in saline and hydrocarbon
14 reservoirs?

15 THE WITNESS: Well, my work focuses on
16 groundwater, and it spans a range of scientific
17 engineering and policy issues. This focus has taken
18 me from the basic physics of forced media flow and
19 reactive transport to geologic carbon storage, to
20 arsenic contamination of groundwater, to groundwater-
21 seawater interaction, to the ecology of heat lands.
22 And I have experience with both field measurements and
23 numerical model development.

24 MR. CHANG: I apologize. Can you give
25 me just one minute? There's an odd beep that's

1 happening throughout the room. Is there anything we
2 can do about it or is should we just -- nothing, we
3 just have to live with it?

4 MS. APODACA: We may have to just live
5 with it. It's the fire alarm.

6 MR. CHANG: Oh, all right. Well, I
7 apologize for the room acoustics this morning. Thank
8 you. Thank you. Please proceed.

9 MS. O'GRADY: Of course. Thank you.
10 What research was highlighted as a key
11 contribution, leading to your recent election to the
12 National Academy of Engineering?

13 THE WITNESS: My research on subsurface
14 fluid flow and groundwater contamination.

15 MS. O'GRADY: Have you published peer-
16 reviewed work on the physics, chemistry, behavior, and
17 engineering of geologic carbon storage?

18 THE WITNESS: Yes.

19 MS. O'GRADY: Please describe your
20 published peer-reviewed work.

21 THE WITNESS: I've published over 60
22 scientific articles across topics in hydrogeology.
23 I've published eight articles, including one editorial
24 on carbon capture and storage.

25 In one relevant science paper, we

1 showed that conventional methods for generating
2 ensembles of subsurface parameters do not produce
3 preferential conduits for flow. Conventional
4 statistical models that generate random fields don't
5 typically allow for connected features of high
6 permeability.

7 And the consequence of this paper's
8 result is that the variogram approach that's detailed
9 in the EPA's UIC Program Class VI well site character
10 site -- characterization guidance fails to generate
11 permeability fields with the most risk of CO2
12 migration. I just picked out that one paper.

13 MS. O'GRADY: Is Conservation Group's
14 Exhibit 4 an accurate copy of your resume?

15 THE WITNESS: Yes.

16 MS. O'GRADY: Dr. Harvey, you supplied
17 direct and rebuttal testimony on behalf of
18 Conservation Groups in this matter, Conservation
19 Group's Exhibits 5 and 25, respectively?

20 THE WITNESS: Yes.

21 MS. O'GRADY: Is that testimony
22 accurate, to the best of your knowledge, and do you
23 adopt it?

24 THE WITNESS: Yes.

25 MS. O'GRADY: In broad terms, what

1 opinions will you provide?

2 THE WITNESS: Well, I will provide
3 opinions on the Division's proposed rules. Overall,
4 my recommendations are grounded in the fact that few
5 CCS projects have injected CO2 into deep saline
6 aquifers, and pre-injection model predictions have
7 proven wrong at saline aquifer facilities from which
8 there is published data.

9 Long-term safety of CO2 storage is a
10 prerequisite for project success because, once an
11 aquifer can be contaminated by CO2-mobilized metals or
12 by brine, it is unlikely to be remediated over human
13 timescales. This factual context demands a regulatory
14 framework that's designed for uncertainty and failure,
15 not -- not one that assumes success.

16 MS. O'GRADY: Can you please explain
17 the different zones of potential endangerment
18 associated with an injection project, and why modeling
19 is limited in its ability to predict the extent of
20 both zones?

21 THE WITNESS: Well, models are used to
22 define -- define two zones of endangerment, a
23 typically larger zone of increased pressure, and then
24 an inner zone of CO2 pure phase plume. The reservoir
25 simulation models used to predict the extent of both

1 zones are inherently unreliable.

2 For example, an analysis of over 500
3 ExxonMobil exploration wells fielded for two decades
4 found that more than 20 percent of the failures to
5 find oil and gas in near-field wildcats -- in other
6 words, regions with a known hydrocarbon system -- were
7 a direct result of mischaracterization of the -- of
8 the trap and seal.

9 Being that even with best-in-class
10 skilled medical site data, 20 percent of the time,
11 reservoir geologists incorrectly surmised that a
12 caprock would contain buoyant oil gas. In the saline
13 aquifer storage context, there's no production
14 history. Data is sparse. And the states of
15 prediction error are higher. The 20 percent failure
16 rate, probably not acceptable here.

17 MS. O'GRADY: Please discuss the
18 importance of designing enforceable protections.

19 THE WITNESS: Well, designing
20 enforceable protections from the get-go will help
21 ensure adequate enforcement is possible down the road.
22 I'll briefly touch on where this shows up in a few
23 different sections of the rule. Three, to be precise.

24 First, the area of review -- the AOR --
25 defines the area of monitoring, corrective action, and

1 seismicity coverage per place. Defining it
2 conservatively from the outset ensures adequate
3 safeguards. The proposed rules define the AOR as the
4 region surrounding the geologic sequestration site
5 where USDWs -- drinking water aquifers -- may be
6 endangered by the injection active.

7 Within this area, action thresholds
8 must be defined before the permit is issued, because a
9 regulatory standard without pre-specified thresholds
10 can't consist -- cannot be consistently or reliably
11 enforced.

12 Second, safety-critical decisions must
13 be automatic, rather than discretionary. The
14 consequences of delayed action will be very difficult
15 to remediate, and operators have economic incentives
16 that run counter to the precautionary response.

17 We have experience in this -- in this
18 country of applying for Class VI permits, but we have
19 very little experience actually injecting large
20 quantities of CO2 into saline aquifers or storage.
21 Most captured CO2, and most of the 45Q tax subsidies
22 are for enhanced oil recovery.

23 Across the world, we have data from
24 only a handful of CO2 storage sites that are not EOR
25 facilities. And the results from these sites are

1 pretty discouraging. They haven't behaved as -- as
2 they were predicted to.

3 In the US, we have only one site -- the
4 Archer Daniels Midland site in Illinois -- that has
5 actually injected much CO2. And as you know, one of
6 their wells suffered corrosion and failure. And
7 furthermore, the CO2 plume moved faster than
8 originally modeled, and was affected by other
9 injection wells. And I want to give a couple quotes
10 here from a recent paper that is my Exhibit 6, Bukar,
11 et al., 2025.

12 So from page -- on page 8, they
13 conclude in their analysis of the 3D seismic data from
14 the site that they used to -- to image the -- the
15 plume.

16 "We have analyzed data from time lapse
17 seismic surveys at the Illinois Basin Decatur
18 Project" -- that's the Archer Daniel Midland
19 project -- "and interpret that the CO2 plume migrated
20 along major faults very soon after injection began,
21 entering upper units of the reservoir, moving
22 laterally in response to injection at the neighborhood
23 site."

24 These observations emphasize the
25 importance of considering faults as potential flow

1 pathways, as well as the impact of pressure from
2 neighboring injection sites on plume dynamics.

3 And earlier, on page 2, they say
4 "During the post-injection phase, well logs detected
5 an isolated finger of CO2 in the injection well, in a
6 shallower zone than the injection interval, the
7 origins of which could not be ascertained previously.

8 The application of an amplitude-
9 agnostic time shift analysis reported here reveals
10 clear, qualitative images of growing CO2 plumes and
11 shower -- shallower pools of storage reservoir that
12 arrived by migration of previously-identified faults."

13 So one important aside here is, we only
14 know about this plume behavior because of the
15 extensive 3D seismic that they -- that they conducted.
16 So I -- the success of Class VI permitting regulations
17 cannot be judged by the number of permits issued, and
18 we should not mistake experience in drafting permit
19 applications and decades of CCS promotion with actual
20 knowledge of how CCS sites perform.

21 And in the rest of my testimony, I will
22 avoid words like "typically" and "usually" to describe
23 what actually could happen in the real world because
24 we just don't have the data to make such claims.

25 And the third point I want to make is

1 about scientific transparency, including disclosure of
2 model assumptions, code validation, calibration
3 metrics, and raw operating data. This is all
4 essential because a regulator who can't see the data
5 and reasoning behind a model's predictions cannot
6 evaluate safety.

7 For example, where CO2 injection
8 volumes or pressures of Class II enhanced recovery
9 operations create risk equivalent to a dedicated
10 storage project, the operation must be subject to
11 Class VI requirements because the Class II framework
12 was not designed to manage the risks of long-term
13 safety storage.

14 Of the Class VI permit applications
15 that I've seen, there is no way I could figure out how
16 they're modeling this. I don't know if this is
17 because of the extensive redactions -- tens of pages
18 are just black, kind of uses up your ink cartridges --
19 or if it's because the regulations don't -- don't hold
20 the applicants to meaningful standards of completeness
21 and transparency.

22 But the information in these
23 applications alone is inadequate for me to understand
24 the modeling plans that -- that underpin their --
25 their application.

1 MS. O'GRADY: Please explain the
2 particular risks associated with long timescale of
3 containment of injected carbon dioxide.

4 THE WITNESS: In short, the time
5 horizon of regulatory protection should match the time
6 horizon of the hazard. And we believe that stored CO2
7 plumes persist for centuries or millennia. Obviously,
8 we don't have any data on that.

9 But we know that infrastructure
10 degrades on timescale to years to decades, and water
11 resources that are impacted -- or that are
12 impractical -- I'm sorry, impractical to develop today
13 could become essential for New Mexico communities in
14 the future.

15 CO2-resistant materials must be
16 required at all depths in wells that may encounter the
17 CO2 plume and should not be required in the injection
18 zone alone.

19 Plume stabilization -- the point at
20 which the CO2 plume is seen migrating -- must be
21 demonstrated through sustained monitoring, rather than
22 assumed for model predictions, or tied to fixed
23 calendar. The option to petition for shortened pre-
24 post-injection site care period before the end of
25 injection should -- should be eliminated.

1 MS. O'GRADY: Turning now to
2 Conservation Group's specific proposed amendments,
3 what is the purpose of the amendment regarding
4 confidentiality of information?

5 THE WITNESS: When -- when constructing
6 a permit application, operators necessarily rely on
7 publicly-available information to build their case for
8 safety. This information often includes earthquake
9 data, well locations, well completion reports,
10 geologic maps, stratigraphic sections, and diagnostic
11 fracture injection tests from existing wells.

12 Claims of confidentiality for this type
13 of information undermines the right of New Mexicans to
14 evaluate key public information that underpins the
15 basis for the -- the permit, and may irreversibly
16 affect their water resources. The rights of New
17 Mexico -- New Mexicans shouldn't be subordinated to
18 the claims of commercial sensitivity of geologic and
19 other relevant data that is already in the public
20 domain.

21 MS. O'GRADY: What is the basis for
22 changing the triggers prompting Class II wells to
23 apply for Class VI permits?

24 THE WITNESS: The -- the proposed rules
25 require a well to transition from Class II to Class VI

1 if the primary purpose of the well shifts, and there
2 is an increased risk to USDWs. Conservation Groups
3 propose to amend this rule to require a transition if
4 either of these circumstances exist.

5 Class II-R levels for enhanced oil
6 recovery should be evaluated for the duration and rate
7 of proposed CO2 injection in the absence of oil and
8 gas extraction. Class II-D proposed -- proposal wells
9 have not been evaluated for CO2 injection. And both
10 cases require a comprehensive site characterization.

11 MS. O'GRADY: What is the basis for
12 requiring consideration of the integrity of the
13 caprock seal when determining whether there is an
14 increased risk to underground sources of drinking
15 water?

16 THE WITNESS: Well, operators should
17 evaluate not just whether caprock exists, but whether
18 that caprock can maintain its sealing capacity under
19 the fluid regimes and pressures and upward buoyancy
20 forces to which it'll be exposed after the CO2 is
21 injected.

22 If an overlying caprock gets -- becomes
23 fractured, faulted, or it's mineralogically reactive
24 to carbonic acid, repurposing the well without
25 comprehensive site characterization introduces a

1 potential migration pathway for a CO2 into the
2 overlying aquifers, where it just splits brine.

3 MS. O'GRADY: What definitional changes
4 do Conservation Groups propose relating to plume
5 stabilization?

6 THE WITNESS: Conservation Groups
7 propose two changes. First, they propose to define
8 plume stabilization. Second, they propose to amend
9 the definition of post-injection site care to require
10 monitoring and other actions, even following cessation
11 of injection to ensure plume stabilization has
12 occurred and the USDWs are not in danger.

13 The rationale for these changes is that
14 the CO2 plume does not stop moving after injection
15 stops. Buoyancy forces continue to drive CO2 upward
16 against the caprock and to drive migration of CO2
17 laterally and vertically, hugging the underside of the
18 caprock. The pressure field also evolves as pressure
19 dissipates outward.

20 The proposed definition of plume
21 stabilization as the point in time at which the
22 injected CO2 stream or plume no longer expands
23 captures the fact that containment cannot be confirmed
24 at the moment injection stops. The proposed change in
25 the definition of post-injection site care would

1 ensure that the period of care stems, at least until
2 the plume stops standing.

3 MS. O'GRADY: What is the basis for the
4 proposed changes regarding interference with
5 containment under anticipated changes in pressure
6 associated with injection?

7 THE WITNESS: The proposed rules
8 address information an operator must submit for
9 consideration, which includes determinations that
10 neither faults or fractures nor seismicity would
11 interfere with containment after injection increases
12 pressures.

13 Conservation Groups propose adding
14 language to both provisions to require that these
15 determinations specifically consider faults and
16 fractures under the anticipated change -- change in
17 pressure associated with injection.

18 Faults near an injection site serve
19 both as potential migration pathways for CO2 or
20 displaced brine, as well as potential sources of
21 induced seismicity that can compromise the mechanical
22 integrity of well parts and surface infrastructure.

23 The current regulatory framework
24 addresses these risks through qualitative seismic
25 history that, in practice, amounts to placement of a

1 regional seismicity map in the permit area. That
2 approach provides no information about how specific
3 faults at a specific site, with their geometry, will
4 respond to the sustained poor water pressure,
5 increases the large volume CO2 injection produces.
6 EPA cited -- cites research supporting this amendment.

7 Ultimately, whether a given fault
8 reactivates and whether reactivation produces -- can
9 conduct a -- a fracture pathway or a damaging seismic
10 event depends on site-specific properties, the local
11 stress field, fault orientation, frictional
12 characteristics, proximity to the crystalline
13 basement, and the magnitude and rate of pressure
14 change. None of these parameters can be evaluated
15 from the regional seismic catalog.

16 However, dynamic fault stability
17 analysis, which entails quantitative modeling of how
18 identified faults respond to projected injection-
19 induced pressure evolution addresses each of these
20 gaps. It requires the operator to characterize the
21 situ stress state, identify and map faults within the
22 pressure footprint, and evaluate whether projected
23 pressure changes are sufficient to bring these faults
24 of failure under site-specific conditions.

25 MS. O'GRADY: Conservation Groups

1 propose a number of changes to the area of review and
2 corrective action rules at 19.15.43.9 E NMAC.

3 Starting with 19.15-439 E2B2 NMAC, what changes do
4 Conservation Groups propose?

5 THE WITNESS: The proposed rules
6 require that the area review and corrective action
7 plan, or CAP, include in a -- include in a description
8 of monitoring and operational conditions that would
9 warrant -- would warrant early reevaluation of the
10 AOR.

11 Conservation Groups propose that these
12 conditions include pre-specified, well-specific
13 exceedance thresholds and pressure monitoring data,
14 and geochemical monitoring data, or the discovery of a
15 previously-unidentified artificial penetration.

16 The rationale for this proposal is that
17 the AOR is derived from a reservoir simulation model,
18 which predicts how pressures will propagate over to
19 CO2 will migrate, and at what rates. This prediction
20 becomes useful only after it has been updated with
21 actual data that describes how the actual CO2 plume
22 behaves.

23 If a pre-specified monitoring threshold
24 is exceeded in any monitoring well, it means the model
25 predictions have failed, and that any product derived

1 from the model, such as the map of the AOR, is no
2 longer dependable. At which point, the appropriate
3 response is to recalibrate the model to match the
4 observed data and re-delineate the -- the AOR.

5 Making this reevaluation automatic upon
6 threshold exceedance removes the discretion to
7 continue operating under an AOR that the operator's
8 own monitoring data have invalidated. And a model
9 that can't reproduce the data it was designed to
10 predict has no basis for predicting the boundaries
11 within which the public is supposed to be protected.

12 The discovery of a new artificial
13 penetration with an AOR is material new information
14 that changes the project risks and must trigger
15 reassessment. This addition is particularly warranted
16 in New Mexico because well inventories, which are
17 basins, are often incomplete.

18 MS. O'GRADY: What is the basis for
19 Conservation Group's proposed amendments regarding
20 independent, third-party verification and use of
21 qualified professional experts?

22 THE WITNESS: The AOR model is a
23 foundational component of the Class VI framework. If
24 the only people who've examined the model are the
25 people the operator paid to build it, the state is

1 accepting a safety determination while it's not
2 independently evaluated.

3 Moreover, recent research shows that
4 even highly experienced geoscientists, with decades of
5 proprietary data, have made predictions about
6 reservoirs that contain considerable uncertainty.

7 The delineation of the AOR requires
8 technical -- technically-specialized skills, requiring
9 deep experience in both numerical methods and site-
10 specific geoscience. The process involves substantial
11 professional judgment at every stage, and these
12 choices affect results in ways that can shift the AOR
13 boundary by kilometers.

14 A qualified professional requirement
15 analogous to existing EPA standards for groundwater
16 monitoring ensures a defensible professional standard.
17 But even simply specifying a qualified person perform
18 the analysis would be an improvement.

19 As an important aside, oil companies
20 successfully use -- the fact that oil companies
21 successfully use multi-phase models does not
22 demonstrate that this approach is necessarily
23 appropriate for guaranteeing Class VI project safety.

24 And I think there are three things that
25 are important to understand here. First, oil

1 companies invest vastly more resources and expertise
2 into their models than are possible for Class VI
3 permit applications.

4 Second, oil companies accept risk
5 that's not acceptable for CO2 storage. Oil companies
6 accept risk in production because not -- not all oil
7 and gas plays produce as much as model. But, you
8 know, a 90, 80 percent success rate is good for them,
9 not necessarily good for us.

10 And third -- and I think most
11 importantly -- oil companies don't apply their models
12 to prove an outcome that they prefer. Instead, they
13 use the models to objectively test scenarios before
14 they make investment decisions. They want to
15 characterize the risk as accurately as they can so
16 they can decide where to put the money.

17 For these reasons -- all three of
18 them -- the use of the models by the oil industry
19 doesn't mean that model results presented in Class VI
20 permits are as valuable for guaranteeing the storage
21 of -- of CO2 -- the safety of CO2 storage.

22 MS. O'GRADY: Can you explain why you
23 support the provision of third-party verification of
24 the modeling ensemble to the public?

25 THE WITNESS: Existing Class VI

1 applications to the US EPA have not made the model
2 evaluation reasoning part of the record available for
3 public comment, requiring instead that the public know
4 how to request specific administrative documents, and
5 be able to do so within a very limited public comment
6 window.

7 MS. O'GRADY: Turning to the proposed
8 amendments to the delineation of the AOR and
9 identification of wells requiring corrective action,
10 what is the basis for requiring the use of peer-
11 reviewed or commercially-available modeling?

12 THE WITNESS: Well, predictions are
13 only as reliable as the software that produces them.
14 Without peer review or a model developed to a
15 commercially-available standard, neither the state nor
16 the public can possibly determine whether the code
17 correctly implements the physics it claims to
18 represent. And without full disclosure of the code's
19 assumptions, the state cannot evaluate whether the
20 model is appropriate for the site.

21 Requiring full disclosure of code
22 assumptions, governing equations, equations of state,
23 and constitutive relationships, ensures that the state
24 can evaluate whether the model is appropriate.

25 The current rule treats AOR modeling as

1 a black box. The operator submits predictions with
2 reasoning behind them. It's often opaque. A
3 regulator reviewing a conclusion without access to the
4 reason behind it cannot perform meaningful oversight.
5 EPA's AOR guidance already recommends each -- each
6 element of this amendment.

7 MS. O'GRADY: Why is the definition of
8 the AOR based on pressure necessary?

9 THE WITNESS: Well, if the AOR is drawn
10 only around the CO2 plume, it may exclude legacy
11 wells, faults, and drinking water supplies with a
12 larger -- within the larger pressure effective zone
13 outside of the small regulatory perimeter of the CO2
14 plume.

15 The pressure front can extend far from
16 the plume itself. And within this zone of increased
17 pressure, elevated formation pressures drive native
18 brines upward through old wells and fractures into
19 overlying drinking water aquifers.

20 To take the precautionary approach to
21 protecting New Mexico's water resources, the AOR needs
22 to be delineated, such that it is at least as large as
23 the maximum extent of the model zone of increased
24 pressure and the model CO2 plume extent. EPA's AOR
25 guidance already takes its position.

1 The regulatory language makes the
2 recommendation of EPA a requirement. This rationale
3 also supports the subsequent proposed provisions,
4 which specify how the -- the AOR should be calculated.

5 MS. O'GRADY: Thank you. And as a
6 quick time check, we're at about halfway through your
7 time. What is the basis for the proposed amendment
8 relating to a modeling ensemble approach when modeling
9 the AOR?

10 THE WITNESS: Well, a single model run
11 produces one prediction of pressure and CO2 migration,
12 with no indication of how wrong this prediction might
13 be. If the single run underestimates the AOR, then
14 legacy wells, faults, and drinking water aquifers
15 within the actual area of influence are left
16 unprotected.

17 For several decades, reservoir
18 engineers have developed a variety of statistical
19 methods for generating ensembles and simulations that
20 attempt to capture uncertainty. Uncertainly --
21 uncertainty is clearly very important for CO2 storage.
22 A 10 percent failure rate is not good. So this large
23 body of technical expertise should -- should not be
24 ignored for CO2 storage.

25 MS. O'GRADY: What is the basis for

1 requiring the carbon dioxide plume simulation include
2 reactive transport modeling accounting for the
3 geochemical reactions and lithology of the target
4 reservoir and caprock?

5 THE WITNESS: In certain rock types,
6 particularly carbonate -- carbonate reservoirs,
7 omitted -- omitting geochemical reactions from the
8 model will produce simulations that are wrong about
9 where the CO2 will go and how the confining formations
10 will perform. And this is because reactions change
11 the rock's porosity, permeability, mechanical
12 strength, and mechanical strength over time.

13 The EPA's AOR guidance acknowledges the
14 need for geochemical considerations, and its site
15 characterization guidance goes further, explicitly
16 discussing reactive transport modeling as a tool for
17 evaluating how "reactions, e.g. loss of carbonates,
18 precipitation carbonates, long-term dissolution of
19 silicates can change permeability, release undesirable
20 elements, alter injectivity, and affect alternate
21 storage capacities."

22 In formations where carbonate minerals
23 are present in the caprock or reservoir, the
24 geochemical effects that reactive transport modeling
25 captures are physical realities that will occur,

1 whether or not the model accounts for it. Making the
2 modeling optional in such formations is equivalent to
3 allowing the operator to ignore a potential
4 degradation mechanism.

5 MS. O'GRADY: What is the basis for
6 explicit regulatory delineation of an intensive
7 corrective action area tied to the anticipated lateral
8 extent of the carbon dioxide plume itself?

9 THE WITNESS: As I discussed earlier,
10 CO2 injection creates two qualitatively different
11 zones of threat to the drinking water, and the
12 regulators should address both. These provisions
13 would require an operator to identify the zone that
14 may come into contact with the CO2 plume to ensure
15 adequate corrective action is taken in the area.

16 The 50 percent bumper is warranted
17 because multi-flow -- multi-phase flow simulations are
18 notoriously uncertain, and ensemble modeling
19 consistently shows substantial uncertainty in plume
20 boundary conditions. Further, the CO2 plume can
21 continue to migrate laterally after it escapes the --
22 the injection formation. That's it.

23 MS. O'GRADY: What is the basis for
24 requiring 3D seismic characterization of the full AOR?

25 THE WITNESS: Well, faults within the

1 AOR are pathways through which CO2 and brine can
2 migrate from the injection zone to overlying drinking
3 water aquifers. And induced seismicity on these
4 faults can damage wellbore infrastructure. You cannot
5 evaluate a fault that you haven't found, and 3D
6 seismic is the best technology, with the coverage and
7 resolution to -- to map faults across the -- the full
8 AOR.

9 MS. O'GRADY: Why should a Class VI
10 project account for interactions with other
11 operational or historic injection projects?

12 THE WITNESS: When multiple wells
13 inject into the same formation, their individual
14 pressure fields combine, pushing the total area of
15 evaluated pressure beyond what any individual well's
16 model would predict, and within the area where
17 drinking water aquifers are at risk. If each well is
18 modeled independently, the -- the resulting AORs will
19 be undersized.

20 MS. O'GRADY: How would this provision
21 account for potential interactions between Class I and
22 Class VI wells?

23 THE WITNESS: Class I hazardous waste
24 injection wells and Class VI CO2 storage wells
25 frequently target the same types of deep saline

1 formations. However, introducing a Class VI project
2 into a formation that already has Class I hazardous
3 waste -- Class I hazardous waste plumes superimposes a
4 more complex and disruptive set of subsurface
5 processes onto an existing containment system that was
6 not designed for these conditions.

7 Specifically, the concern is pressure
8 interaction. CO2 injection generates pressure
9 perturbations that propagate far beyond the CO2 plume
10 itself. So a preexisting Class I facility may find
11 that the safety margins embedded in its containment
12 analysis are no longer valid once a nearby Class VI
13 project alters the pressure field.

14 The geochemical dimension compounds the
15 pressure concern. If the CO2 plume or CO2-saturated
16 brines migrate far enough to interact with the
17 hazardous waste plume, it introduces carbonic acid
18 into a geochemical system that the Class I permit may
19 never have been evaluated for.

20 The regulatory gap here is
21 straightforward. Under the current framework, Class
22 II and Class VI permits are issued -- issued
23 independently under separate regulatory programs,
24 often by different agencies. Each permit is issued as
25 if the other program doesn't exist.

1 This exact risk is playing out at the
2 Marquis Carbon Injection Project in Putnam County,
3 Illinois, as discussed in greater detail in my pre-
4 filed direct testimony. New Mexico shouldn't
5 replicate this regulatory gap.

6 MS. O'GRADY: What is the basis for the
7 proposal that specific predictions at a key monitoring
8 well be used to help ensure that the carbon dioxide
9 plume model is sufficiently accurate in its
10 representation of plume evolution?

11 THE WITNESS: Okay. So this is a --
12 this is an important proposal. Without direct
13 observational evidence that the CO2 plume is going
14 where the model says it should, the -- the entire
15 permit safety framework rests on an uncertain and
16 untested hypothesis.

17 If the plume migrates in an unexpected
18 direction or at an unexpected rate, it may encounter
19 legacy wells, faults, or confining zone weaknesses.
20 And the corrective action plan that the corrective
21 action plan did not address. And the consequence is
22 undetected migration towards drinking water aquifers.

23 If an operator cannot predict CO2
24 arrival at a location chosen for maximum confidence,
25 the operator's claims about which aquifers are safe

1 and which faults are beyond the pressure front, lack
2 credibility.

3 Pre-injection models have failed to
4 capture plume behavior at CCS sites -- the ones for
5 which we have data -- they've almost all failed.
6 Requiring AOR reevaluation upon prediction failure
7 is -- is necessary for developing a useful model.

8 MS. O'GRADY: Why do you recommend that
9 New Mexico adopt regulation requiring Class VI
10 applicants to document a detailed search for
11 artificial penetrations?

12 THE WITNESS: Every missed well within
13 the AOR is a potential unmonitored, unevaluated
14 conduit through which injection-driven pressure can
15 push contaminated brine into a drinking water aquifer.
16 Relying on a single database may miss wells.

17 EPA guidance identifies state
18 databases, county records, and private databases as
19 necessary sources, and acknowledges that detecting
20 abandoned wells can be very challenging. This
21 amendment codifies the multi-source search that the
22 guidance already described as necessary.

23 MS. O'GRADY: And what is the basis for
24 the requirement that operators field test all
25 abandoned wells without complete plugging records?

1 THE WITNESS: A well for which there is
2 no -- there's no plugging record may be completely
3 open to the injection zone, completely sealed, or
4 anything in-between. The only way to know is to go
5 look at the well.

6 MS. O'GRADY: What is the basis for the
7 requirement that corrective action be taken on wells
8 determined to penetrate into the confining layer, or
9 that are located in the intensive corrective action
10 area, in addition to other wells determined to need
11 corrective action?

12 THE WITNESS: There is uncertainty in
13 the depth of the boundaries of different layers across
14 an AOR. And since the precise topography of the tops
15 and bases of formations is not known without direct
16 observations. In many shale-y formations, some
17 portions of the formation are more permeable than
18 others.

19 The precautionary principle dictates
20 that a well penetrating any depth of the confining
21 layer should be treated as a potential leakage
22 pathways -- pathway.

23 Any well within the ICAA has potential
24 to come in contact with the CO2 plume. And we know
25 that CO2 and brine is a corrosive environment for

1 standard materials, carbon, steel, and portable
2 cement, used to construct and plug most abandoned
3 wells in New Mexico's mature basins.

4 Within the ICAA, where CO2-bearing
5 brine will plausibly be present, any conventionally-
6 plugged well is therefore a potential pathway for
7 contamination of overlying drinking water aquifers.
8 One that may fail immediately, but will fail
9 eventually, as the cement degrades over the years to
10 decades that have been exposed to CO2.

11 MS. O'GRADY: What is the basis for the
12 requirement that owners or operators use CO2-resistant
13 materials in all components of well plugging used and
14 at all depths?

15 THE WITNESS: Conventional Portland
16 cement and carbon steel are known to degrade with
17 exposure to CO2 mixed in brine. Conventional
18 materials are certain to degrade, but the rate and
19 consequences are uncertain. At ADM's Decatur
20 facility -- that's the Archer Daniels Midland site --
21 the only facility that is injected -- and it's the
22 only facility that's injected a large quantity of CO2.

23 An -- an EPA-permitted -- permitted
24 monitoring well, built under modern Class VI
25 requirements, developed corrosionally within -- within

1 just a few years of construction. Plugging a well
2 with CO2-resistant material at select intervals fails
3 to address some problems. CO2 is buoyant and can
4 migrate along -- along the wellbore.

5 And I think it's very useful to think
6 about how, when a narrow finger of CO2 migrates along
7 part of a -- of a borehole, it can create enormous
8 buoyant forces that keeps it moving upward.

9 Any interval it reaches can become a
10 failure point. The cost difference between CO2-
11 resistant and conventional material is dwarfed by the
12 magnitude of the -- of the 45Q tax credit that
13 operators are expected to receive from the federal
14 government.

15 MS. O'GRADY: What are the proposed
16 amendments regarding AOR reevaluation?

17 THE WITNESS: There are a few proposed
18 changes to this provision. The first change ties back
19 to where Conservation Groups propose the operators
20 confirm the model's validity by placement of a
21 monitoring well where the plume is modeled to be after
22 one year of commencement of injection.

23 Increased pressure also endangers
24 drinking water beyond the plume itself. If the
25 pressure increase fails to confer -- conform to

1 modeled expectations, then the model is not consistent
2 with the subsurface it was supposed to represent. And
3 the AOR -- AOR it produced is no longer defensible.
4 The basis for the other proposed triggers for AOR
5 reevaluation I discussed earlier in my testimony.

6 MS. O'GRADY: Turning to injection well
7 construction requirements, what are the proposed
8 amendments?

9 THE WITNESS: Monitoring wells are
10 designed to test for increased CO2 concentrations and
11 therefore shouldn't degrade in the presence of the --
12 in -- in the presence of CO2. For this reason alone,
13 they should be constructed throughout the wellbore
14 with materials they have the best chance of
15 withstanding the corrosive environment introduced by
16 CO2, salt, and brine.

17 MS. O'GRADY: What are the proposed
18 amendments for testing and monitoring requirements
19 with regards to groundwater monitoring?

20 THE WITNESS: The proposed rules
21 require a groundwater monitoring plan, but they don't
22 require that the plan specify how contamination will
23 be statistically determined. The operator is not
24 required to specify what constitutes the detection,
25 what statistical test is applied, what significance

1 level is used, or how many background samples are
2 needed.

3 These choices are left to the
4 regulator -- regulator's case-by-case approval of plan
5 language that may be qualitative rather than
6 quantitative. The result is that two Class VI permits
7 could use entire different statistical approaches or
8 no formal statistical approach at all. And both would
9 be compliant.

10 In contrast, RCRA's regulations,
11 developed over decades of hazardous waste monitoring,
12 require the operator to specify the complete
13 quantitative framework before the permit is issued.
14 If EPA determined that hazardous waste facilities
15 requires pre-specified statistical rigor to protect
16 groundwater, there is no scientific basis for
17 requiring less of CO2 storage facilities.

18 MS. O'GRADY: What are the proposed
19 amendments regarding the number of monitoring wells?

20 THE WITNESS: Several Class VI
21 applications in other states have relied on data from
22 a single well, or on analog data from distant
23 formations, an approach that provides little basis for
24 evaluating whether the characterization represents the
25 site geology.

1 The subsurface properties that control
2 CO2 flow may vary over short distances, and cannot be
3 inferred from measurements made elsewhere.

4 MS. O'GRADY: What is the justification
5 for a network monitoring design that accounts for
6 detection of maximum risk scenario simulations?

7 THE WITNESS: The scenarios likely to
8 damage USDWs are precisely the ones the model
9 underestimates or misses. Migration along an
10 unprotected fault flow through a legacy well, the
11 inventory missed, or pressure-driven brine
12 displacement at the AOR periphery. If monitoring
13 wells are not placed to detect failures, the first
14 evidence of failure may be contamination of drinking
15 water.

16 MS. O'GRADY: What is the basis for the
17 requirement to run additional simulations of the CO2
18 plume, in which grid spacing is increased and
19 decreased by a factor of two?

20 THE WITNESS: Probably the -- this is a
21 simple, but I think very important modification that's
22 often overlooked. Model grid spacing is a well-known
23 source of serious errors in models of fluid flow in
24 the subsurface, particularly models of two-phase flow,
25 like CO2 and brine.

1 CO2 often migrates in thin layers --
2 thin vertical upwellings, fingering patterns that
3 cannot be captured by large grid spacing in models.
4 And so models that failed to predict this rapid, long-
5 range thin finger migration -- models failed to
6 predict it.

7 At the ADM site in Illinois that I
8 talked about, the re-analysis of seismic data
9 indicated that CO2 moved upward faster than predicted.
10 At the Norwegian Sleipner site, esoteric models had to
11 be employed to re -- the remarkable sequence of
12 appearance of vertical -- horizontal layers of CO2
13 that sort of migrated upward from the point of
14 injection.

15 To begin to assess whether grid spacing
16 correctly resolves physical behavior, the modeler can
17 try different resolutions and see if the output
18 changes. This is a fundamental part of verifying the
19 numerical code because the choice of grid spacing is
20 often completely subjective and it doesn't represent,
21 you know, a physical reality. And so it should not be
22 overlooked.

23 MS. O'GRADY: What is the basis for
24 mandating the completion of a pressure fall-off test?

25 THE WITNESS: As a minimum, a pressure

1 fall-off test must be performed onsite because the
2 intent is to measure onsite hydraulic parameters, and
3 running to completion gets better information.
4 However, diagnostic fracture injection test, a DFIT,
5 would be preferable because only this test can
6 determine the maximum safe pressure for injection,
7 the -- the fracture -- fracture.

8 Diagnostic fracture injection tests
9 measure the fracture closure pressure and formal --
10 formation permeability and reservoir characteristics
11 that directly control whether injection will exceed
12 geomechanical limits. Substituting data from another
13 site could be invalid.

14 MS. O'GRADY: Please explain the need
15 for continuous monitoring at monitoring wells.

16 THE WITNESS: Elevated formation
17 pressure is the primary mechanism by -- by which CO2
18 injection can contaminate drinking water aquifers
19 beyond the CO2 plume itself. If the actual pressure
20 response exceeds what the model predicted, drinking
21 water aquifers far from the wellhead may be at risk.

22 Continuous pressure monitoring, even
23 when not approaching a threshold, is the key
24 measurement for testing and calibrating models as --
25 as demonstrated at -- Snøhvit, Norwegian site, and the

1 In Salah sites.

2 Continuous monitoring is warranted
3 because a gauge that records only at scheduled
4 intervals may capture a trend, but can't identify the
5 timing of discrete pressure events that can indicate a
6 state with the -- with the temporal resolution needed
7 to trigger an operational response before the event
8 progresses.

9 MS. O'GRADY: What is the basis for
10 mandatory surface air monitoring?

11 THE WITNESS: Surface air monitoring
12 provides a detection method independent of the
13 subsurface well network and can catch CO2 releases
14 over a larger area that may contain leaks through
15 failed legacy wells, unknown penetrations that -- that
16 vent directly to the surface. In areas with high
17 legacy well density, a failed well blower venting to
18 the surface may be detected only by atmospheric
19 sensors.

20 MS. O'GRADY: What is the basis for
21 requiring the use of peak ground velocity or peak
22 ground acceleration?

23 THE WITNESS: Well, what damages
24 wellbore cement, shears casings, opens fractures
25 through CO2 -- through which CO2 can reach drinking

1 water aquifers, is the ground motion, not the energy
2 released at the earthquake source. Two earthquakes of
3 the same magnitude can produce vastly different ground
4 shaking, depending on depth, distance, local geology.

5 Switching to one of these metrics
6 calibrates the threshold to the actual risk of damage
7 to the infrastructure protecting drinking water,
8 rather than -- yeah, I'll leave it there.

9 MS. O'GRADY: What is the basis for
10 requiring periodic material compatibility
11 recertification of monitoring well construction
12 against CO2 corrosion knowledge?

13 THE WITNESS: Because CO2 injection in
14 the saline aquifers is still largely experimental.
15 There has been only one site, the ADM site, with
16 significant injection in the US. The science in
17 material behavior under CO2 storage conditions is
18 still evolving. A monitoring well, built to
19 specification considered adequate a couple of years
20 ago may not meet current understanding of CO2
21 corrosion risk.

22 And a well that is itself degrading
23 cannot reliably monitor whether drinking water
24 aquifers are being contaminated. Periodic
25 recertification against current knowledge prevents the

1 monitoring infrastructure on which drinking water
2 protection depends from being grandfathered in under
3 specifications that advances in science may render
4 inadequate.

5 MS. O'GRADY: Turning to reporting
6 requirements, what is the basis for requiring
7 reporting of all gauge malfunctions and
8 instrumentation failures?

9 THE WITNESS: For regulatory agencies
10 to have confidence that monitoring data are complete
11 and accurate, they have to know when data are missing,
12 suspect, or interpolated across gaps. Even a short
13 instrumentation failure can coincide with transient
14 pressure excursions, a seismic event, or anomalous
15 geochemistry, whose significance only will become
16 apparent in retrospect.

17 Without mandatory reporting, the
18 monitoring record presented to the regulator appears
19 complete when it is not, and compliance determinations
20 are made on data whose reliability is unknown. This
21 is a data integrity issue, with negligible compliance
22 costs relative to the value of the information it
23 provides.

24 MS. O'GRADY: What is the basis for the
25 elimination of pre-injection cessation, post-injection

1 site care shortening petitions, and a demonstration of
2 at least five years of rigorously-defined plume
3 stabilization before such petitions are approved?

4 THE WITNESS: Allowing an operator to
5 petition for shortened post-injection monitoring
6 before injection has begun, or while it's ongoing,
7 allows the most consequential long-term drinking water
8 protection decisions to rest on a model that hasn't
9 been tested against all of the operational data.

10 Plume stabilization must ultimately be
11 demonstrated through post-injection monitoring data,
12 not assumed from model predictions. Only after --
13 only after a body of operational evidence has
14 accumulated can a shortened post-injection site care
15 petition be adequately evaluated.

16 Restricting the timing of post-
17 injection site care petitions is insufficient,
18 however, if the standard the petition must meet is
19 left vague. Plume stabilization -- the point at which
20 the CO2 plume has essentially ceased migrating -- is
21 the condition under which it becomes reasonable to
22 reduce monitoring because a plume that stopped moving
23 is no longer encountering new potential pathways to
24 drinking water aquifers.

25 Without a rigorous definition, an

1 operator can characterize a pause in migration as
2 stabilization, secure reduced oversight, and then face
3 resumed plume movement that goes undetected.

4 Requiring five consecutive years of
5 demonstrated stability, as discussed earlier with a
6 proposed definition of plume stabilization, provides
7 an evidentiary standard high enough to distinguish
8 genuine stabilization from temporary equilibrium,
9 seasonal variations, or sensor drift. Drinking water
10 protection obligations should not be reduced until the
11 standard is met with observed data.

12 MS. O'GRADY: In the interests of time,
13 I'm going to skip the next question and jump to the
14 last question. What are the proposed changes to
15 conditions that would require immediate cessation of
16 injection? And what are their bases?

17 THE WITNESS: There are a few proposed
18 changes to this provision. First, a significant
19 seismic event is grounds for cessation. An earthquake
20 induced by CO2 injecting can damage the wells of
21 cement seals that prevent CO2 and brine from reaching
22 drinking water aquifers. And once a pool has been
23 opened as a fluid transmission pathway, the
24 contamination risk is immediate and irreversible.

25 Second, a statistically-significant

1 geochemical change is direct evidence that the
2 containment system is not performing as predicted.
3 The rational response to observed evidence of
4 containment is to remove the driving force injection
5 pressure immediately before the pathway widens, or
6 additional formations are affected, and while the
7 operator works to establish whether the seal has
8 indeed been breached or bypassed.

9 Third, I've discussed the dangers
10 associated with release of carbon dioxide detected by
11 surface air monitoring earlier in my testimony.

12 Fourth, evidence of unauthorized fluid
13 migration, specifically that CO2 or displaced brine
14 has entered an unauthorized zone, means the container
15 system has failed and continued injection will only
16 drive more fluid through the breach.

17 Allowing discretionary resumption
18 before remediation is complete creates a structural
19 incentive to characterize the problem as minor and
20 resume revenue-generating injection rather than close
21 the pathway.

22 Fifth and finally, gauge malfunctions
23 for longer than a week warrant injection cessation
24 because pressure and geochemical gauge -- well,
25 pressure gauges at a CO2 injection facility are the

1 only real time indicator of whether injection is
2 proceeding safely.

3 Leaving the decision of when to restore
4 instrumentation instruments to operator discretion
5 creates an economic incentive to continue inject --
6 injection during data gaps, rather than incur the cost
7 of shutdown.

8 MS. O'GRADY: Thank you for that
9 summary of your direct testimony. We will now move to
10 your summary of rebuttal testimony. Let me know when
11 you're ready. No rush.

12 THE WITNESS: Let me get myself
13 organized here. Okay. I think I've got myself
14 organized.

15 MS. O'GRADY: Okay, great. Thank you.
16 In broad terms, what opinions does your rebuttal
17 testimony provide?

18 THE WITNESS: Oxy's proposed
19 modifications relax the regulatory framework on which
20 the safety of New Mexico's drinking water depends.
21 For proposed modifications to the protections proposed
22 by the Division, or by Conservation Group's operator
23 costs or convenience is a key justification rather
24 than scientific evidence.

25 MS. O'GRADY: Oxy's witness recommends

1 that the list of minor modifications not subject to
2 formal permit revision procedures include "non-
3 material, non-substantive permit modifications that do
4 not increase risk to underground sources of drinking
5 water to prevent permitting delay." What is your
6 response?

7 THE WITNESS: This catchall category
8 provides too much leeway to a single official without
9 the benefit of formal and independent review. The
10 terms in the proposed formulation, i.e., "non-
11 material, non-substantive, and does not increase risk"
12 are subjective. They shift determination of risk to
13 the operator and bypass public review.

14 Oxy's witness argues that the
15 director's ability to subject a Class VI permit to
16 modification, revocation, and reopening public
17 participation for any amendment creates significant
18 uncertainty for project developers. However, the
19 purpose of Class VI permitting is to protect
20 underground sources of drinking water, not to minimize
21 uncertainty for developers.

22 If a modification generally does not
23 affect risks to underground sources of drinking water,
24 the operator should have no difficulty demonstrating
25 that through a formal review. A modification that

1 cannot survive public scrutiny should not bypass it.

2 MS. O'GRADY: Oxy's witness recommends
3 that New Mexico "match the frequency of area of review
4 reevaluations to the five-year frequency of the
5 federal rules, as the data collection and simulations
6 needed to reevaluate an area of review are time-
7 intensive." What is your response?

8 THE WITNESS: Oxy's witness grounds his
9 argument in costs and convenience again. The
10 commission should begin with a different premise,
11 protection of New Mexico's drinking water aquifers.
12 The precautionary principle demands frequent
13 demonstrations of safety. Moreover, claims about
14 prohibitive costs should be weighed against the
15 substantial federal subsidies -- tens of millions of
16 dollars annually -- that these projects will receive.

17 And I want to emphasize one particular
18 physical reason why early review is vital. And that
19 is that the information provided by pressure data
20 comes early and fast during injection. Pressures at
21 the wellbore change very quickly, immediately after
22 injection begins. And then the rate of pressure
23 change decreases, roughly logarithmically with time.

24 For this reason, the information
25 content of pressure data is greatest early and should

1 be acted on. If I were managing a project, I would
2 begin work on recalibrating the model immediately
3 after injection begins. You learn a lot right away,
4 and I certainly would not wait for years.

5 The ADM Decatur Project in Illinois
6 illustrates why more frequent evaluation is warranted.
7 Within the first decade of injection, and after
8 injecting only a few million tons, pre-injection
9 models have failed to predict actual pool behavior,
10 and a monitoring well developed corrosion failures.

11 If infrastructure damage and unexpected
12 migration occur within a few years at a well-
13 characterized site, a five-year reevaluation cycle is
14 insufficient.

15 MS. O'GRADY: Oxy's witness recommends
16 that groundwater monitoring be required annually
17 rather than quarterly, as she claims that "quarterly
18 monitoring is an excessive burden on owners or
19 operators, but does not provide additional protection
20 to water quality and the environment generally." What
21 is your response?

22 THE WITNESS: Again, the precautionary
23 principle instructs that the risk of damage to New
24 Mexico's water resources means -- requires more
25 frequent monitoring. Oxy provides no basis to support

1 the idea that quarterly monitoring provides no
2 additional protection for annual monitoring. Peer-
3 reviewed literature, the EPA, and statistical
4 reasoning contradict this position.

5 Monitoring frequency is a fundamental
6 component of monitoring design that determines
7 statistical power and how quickly changes in
8 groundwater conditions could be detected. Only one
9 data point per year is just not enough.

10 The RCRA regulatory framework, which
11 also addresses management of hazardous waste, provides
12 a helpful comparison. Given the complex hydrologic
13 processes, strong buoyancy effects, a larger pressure
14 footprint here, sampling frequency on par with or more
15 rigorous than RCRA is warranted.

16 MS. O'GRADY: Oxy's witness supports
17 the addition of gamma ray testing, but encourages the
18 Division to "remove spontaneous potential as a logging
19 method, as it provides redundant information and can
20 increase risks to well integrity." Oxy also
21 recommends that the list of logs and tests be made
22 optional. What is your response?

23 THE WITNESS: Gamma array resistivity,
24 spontaneous potential, caliper logging are all
25 essential tools that enable characterization of a

1 wellbore. Each tool captures different information,
2 as discussed in my written rebuttal testimony.
3 Eliminating spontaneous potential as a logging
4 requirement and making other logging tools optional
5 would weaken the regulation's ability to protect it.

6 Regarding the proposed elimination of
7 spontaneous potential, I have a few concerns. First,
8 spontaneous potential logging responds to salinity.
9 Gamma ray logging is not analogous because it responds
10 to rock mineralogy rather than fluids in the rock. So
11 it can't determine whether the groundwater is fresh or
12 saline.

13 Second, spontaneous potential is a
14 simple sensor, consisting of a single passive
15 electrode mounted on the wire line string, and it's
16 recorded passively on the same wire line was sent --
17 as the same tool -- on the same stool -- tool string
18 as the resistivity log that Oxy's witness proposes to
19 retain. Since the tool is already in an open hole,
20 I -- I don't see any incremental risk to well
21 integrity.

22 I also have concerns regarding the
23 proposed -- proposal to make each logging test
24 optional, as conveyed in the language from "must" to
25 "may" and the change from "and" to "or." The

1 mandatory logging suite doesn't just provide technical
2 content. Because the required logs are specified in
3 the rule, they become part of the permit application,
4 which is subject to public notice and comment under
5 Class VI permitting processes.

6 If an operator is permitted to propose
7 whatever logging program it prefers, the burden shifts
8 from the regulator -- or to the regulator or the
9 public to identify missing logs and argue for their
10 inclusion during review of the public comment.

11 MS. O'GRADY: Oxy's witness recommends
12 that New Mexico "decrease the frequency of review and
13 amendment of the emergency and remedial response plans
14 to match the five-year frequency of the federal
15 rules." What is your response?

16 THE WITNESS: The emergency and
17 remedial response plan governs what happens when
18 containment fails. Since operational conditions
19 relevant to this plan, for example, injection rate,
20 nearby drilling activity, monitoring results,
21 community circumstances, all change continuously.
22 Extending the plan review could render it out-of-date
23 when it's needed.

24 Instead of making review less frequent,
25 I would recommend the plan to be made publicly-

1 available annually, shared widely, and accompanied by
2 public hearings in the affected communities. The
3 people whose drinking water is at risk have the right
4 to know what steps are being taken to protect it, and
5 they have a right to raise concerns before a crisis
6 occurs. This public visibility would also incentivize
7 operators to keep their plans current.

8 MS. O'GRADY: Oxy's witness recommends
9 that "in the case of evidence showing that the
10 injected carbon dioxide stream, and associated
11 pressure front, may cause an endangerment to an
12 underground source of drinking water, the owner and
13 operator only be required to immediately cease
14 injection in the impacted well." What is your
15 response?

16 THE WITNESS: Injection wells within
17 the same project are usually hydraulically connected.
18 The pressure field created by one well affects, and is
19 affected by, those of others. If an operator is
20 allowed to continue injection activities in other
21 wells within a project, it creates an incentive for
22 them to characterize potential endangerment as
23 localized, and continue injecting at other wells,
24 despite the risk.

25 Requiring cessation of all injection at

1 the project until an operator has demonstrated that
2 the source of potential endangerment has been
3 identified or mediated is the best way to protect New
4 Mexico's water resources.

5 MS. O'GRADY: Thank you for the summary
6 of your rebuttal testimony.

7 Dr. Harvey is now available to give
8 surrebuttal. Should we take a quick break first?

9 THE HEARING OFFICER: I think that's a
10 good idea. Let's come back at 10:45.

11 (Off the record.)

12 THE HEARING OFFICER: Let's come back
13 from the break, please. Do we have Dr. Harvey?

14 THE WITNESS: Yes. I'm here.

15 THE HEARING OFFICER: There you are.
16 Go ahead, Ms. O'Grady.

17 MS. O'GRADY: All right. So,
18 Dr. Harvey, Mr. Eales testified on Wednesday that a
19 plume migrating outside the area of review would be
20 unlikely to trespass on pour space belonging to other
21 people because unexpected migration would first
22 trigger an area of review reevaluation. Can you talk
23 about your experience operating a CCS company and
24 thinking about trespass issues?

25 THE WITNESS: Yeah. Yeah. Happy to.

1 When we started the CCS company back in 2008, we
2 considered only storage formations that had structural
3 lateral containment in addition, obviously, to a good,
4 confined caprock. This lateral containment could be
5 either an anticline storing in the CO2 -- you know,
6 upside down bowl -- or a structural crack having to do
7 with, well, geologic structure.

8 We took this approach because lateral
9 containment provided confidence that the bounds of
10 lateral -- on the bounds of lateral CO2 migration.
11 Buoyancy can drive thin layers of CO2 long distances
12 along the upper sloping underside of caprocks. And we
13 considered lateral structural confinement to be
14 necessary to keep the plume from trespassing under
15 property where we did not have pour space rights.

16 And furthermore, it was the only
17 rational way to map the unitization area. We also
18 applied for a patent for injecting large quantities of
19 air to test the integrity of formations. We thought
20 that an empirical confirmation of integrity was
21 important, and insurance companies asked for it as a
22 means to conduct their actuarial calculations.

23 Now, this precautionary thinking waned
24 with shifting politics, and as it became evident that
25 almost all 45Q subsidies would go to AOR, not geologic

1 storage. So now, flash forward 20 years, and the
2 topic has shifted towards modeling the uncertain
3 migration of CO2 plumes through formations without
4 platform containing it.

5 MS. O'GRADY: Division witness
6 Dr. Hassan Khaniani rejects Conservation Group's
7 proposal to require third-party verification of the
8 modeling ensemble at pages 6 through 7 of his rebuttal
9 testimony, in part because public comment should
10 already provide an opportunity for technical
11 evaluation of the application and supporting
12 materials.

13 Is the information made available to
14 the public for technical evaluation during the public
15 comment period generally adequate for technical
16 evaluation?

17 THE WITNESS: No. Dr. Khaniani states
18 on page 7 of -- of his rebuttal testimony that
19 "meaningful public participation is best supported by
20 ensuring that the administrative record contains
21 sufficient technical information to allow interested
22 parties to independently evaluate the applicant's
23 modeling and analysis."

24 He goes on to say that "information
25 should include, at a minimum, the model approach,

1 software use, geologic framework, modeling
2 assumptions, input parameters, boundary conditions,
3 calibration data, sensitivity, and uncertain analysis,
4 plume and pressure front projections, and area of
5 review results."

6 But that's exactly the problem. Permit
7 applications generally don't disclose all this
8 information, leaving the public in the dark about the
9 technical details, and whether the applicant's
10 analysis was adequate. That's exactly why the rules
11 should require either disclosure of these details, or
12 publication of third-party verification.

13 Frankly, I've looked at some of these
14 permit applications and they're inscrutable, even to
15 someone like me, because so much of the information is
16 redacted.

17 MS. O'GRADY: Similarly, Dr. Khaniani
18 rejects Conservation Group's proposal to require
19 third-party certification of the area of review at
20 pages 8 through 9 of his rebuttal testimony. Again,
21 in part because public comment provides an opportunity
22 for additional review. What is your response?

23 THE WITNESS: As with the modeling
24 ensemble, permit applicants simply don't disclose
25 enough information for the public to be able to

1 independently evaluate the area of review model and
2 conclusions, as with his response to the proposed --
3 proposal that third-party verification be required
4 without modeling ensemble.

5 Dr. Khaniani states, on page 8 of his
6 rebuttal testimony that the information in the
7 administrative record for the purpose of not just your
8 Division and EPA's review, but also that third-party
9 reviewers in the public "should include the modeling
10 approach, software use, site characterization data,
11 geologic framework, model assumptions, input
12 parameters, boundary conditions, calibration
13 methodology results, sensitivity and uncertainty
14 analysis, plume and pressure front projections, and
15 the resulting area of review and determination."

16 If the administrative records for these
17 projects contain this kind of information, the public
18 would have adequate chance to provide additional
19 review, and we would not need to propose this rule
20 change.

21 MS. O'GRADY: Can you describe what
22 must be made available to the public during the public
23 comment stage under 19.15.41.8 E6D?

24 THE WITNESS: The public can request to
25 see both the draft permit and the application under

1 those rules.

2 MS. O'GRADY: Have you ever seen a
3 redacted Class VI permit?

4 THE WITNESS: Yes, I have.

5 MS. O'GRADY: I'm going to pull up a
6 document on my screen. Do you recognize this document
7 as a Class VI -- hold on. Actually, I will scroll to
8 the first page.

9 Do you recognize this document as a
10 Class VI permit application, specifically the Oxy
11 Brown Pelican application? And have you had an
12 opportunity to review it?

13 THE WITNESS: Yes, I have.

14 MS. O'GRADY: I'm going to show you
15 pages 108 through 109 of this PDF. What does figure
16 43 represent, and what would the redacted information
17 have told you?

18 THE WITNESS: See, I think I need to
19 see 109. Is that it?

20 MS. O'GRADY: That's 109.

21 THE WITNESS: Okay. Yeah. So figure
22 43 -- well, the caption says "Relative permeability
23 and capillary pressure for the injection zone." Yeah.
24 So it should -- I imagine it would show relative
25 permeability curves.

1 MS. O'GRADY: And why is that
2 information important?

3 THE WITNESS: That's -- that's a key
4 input to modeling simultaneous CO2 and water flows.

5 MS. O'GRADY: Turning to pages 113 to
6 114 of the PDF. Here's page 113. Here's page 114.
7 Table 4 overlaps. What does table 4 represent, and
8 what would the redacted information have told you?

9 THE WITNESS: So from the title there,
10 I think it's -- it's a history match of a
11 parameterized relative permeability curve, but, you
12 know, I can't see that. Just guessing.

13 MS. O'GRADY: And then turning to page
14 152 of the PDF, this page tells you what appendix B
15 would show you. Can you read off the highlighted
16 paragraph?

17 THE WITNESS: "OLCV conducted an
18 airborne magnetic survey in May of 2023 to identify
19 and/or confirm the location of existing artificial
20 penetrations in the AOR. The data from the survey was
21 analyzed and interpreted by Oxy and OLCV
22 geophysicists. Magnetic anomalies were cross-
23 referenced with aerial photos, drone photographic
24 surveys, and physical site observations, where
25 necessary. See Appendix B for additional details on

1 identifying APs."

2 MS. O'GRADY: Turning to page 182, what
3 is this section of the document?

4 MR. TUCKER: Madam Hearing Officer, I'm
5 going to object here. I think this is outside the
6 scope of surrebuttal here.

7 THE HEARING OFFICER: Is this
8 Mr. Tucker?

9 MR. TUCKER: Yes. Sorry. This is
10 Mr. Tucker, for the record.

11 THE HEARING OFFICER: Oh, hello.

12 Ms. O'Grady, would you describe,
13 please, how this is rebuttal?

14 MS. O'GRADY: Absolutely.

15 THE HEARING OFFICER: A surrebuttal,
16 excuse me.

17 MS. O'GRADY: Absolutely. Thank you,
18 Madam Hearing Officer. This relates to two of the
19 prior questions about Dr. Hassan Khaniani's testimony
20 about what is included in typical Class VI permits as
21 they're made available to the public. And we just
22 have one more question and then we'll turn to the next
23 line of questioning.

24 THE HEARING OFFICER: All right.

25 I do remember an earlier discussion,

1 Mr. Tucker, about what was available to the public,
2 and what would be protected as confidential
3 information. So the objection is overruled.

4 Go ahead, Ms. O'Grady.

5 MS. O'GRADY: Thank you.

6 Dr. Harvey, can you say once more what
7 you believe this section provides, based on the title
8 of this page and what it might be?

9 THE WITNESS: There's appendices giving
10 information about the area. And then it says it's
11 wholly, entirely redacted.

12 MS. O'GRADY: Okay. And I'm just going
13 to show this section here on a contact sheet so you
14 can see this sweep of pages. And I just made it too
15 small. There we go. What would the redacted
16 information have Appendix B have shown you?

17 THE WITNESS: I -- I don't know for
18 sure, but presumably, it would show information about
19 where -- where old wells could be found.

20 MS. O'GRADY: So is this portion of the
21 application helpful to you in your review as a member
22 of the public?

23 THE WITNESS: No, it's frustrating;
24 right? Because I'd be interested in knowing that
25 about the potential pathways to the surface.

1 MS. O'GRADY: And then as an expert,
2 would this be useful to you?

3 THE WITNESS: Sort of obviously not;
4 right? It's a lot of pages of black ink.

5 MS. O'GRADY: Thank you. Turning to
6 the next question. Division's witness, Dr. Schnaar,
7 claims on page 15 of his rebuttal testimony that "the
8 introduction of definitions for intensive corrective
9 action area and plume stabilization risks creating
10 ambiguity over how these terms relate to existing
11 Class VI requirements and whether they establish new
12 regulatory thresholds, obligations, or decision
13 criteria." What is your response?

14 THE WITNESS: The introduction of the
15 terms "intensive correction action" and "plume
16 stabilization" are intended to establish -- are
17 intended to establish new obligations. That's why the
18 definitions are proposed. Conservation Groups
19 proposes that the ICAA be defined as an area into
20 which brine with super-critical carbon dioxide will
21 potentially intrude, plus a buffer to account for
22 modeling error.

23 Then they propose that the ICAA be
24 identified as a subset of the area of review. Once
25 the ICAA has been identified, owners and operators

1 must perform corrective action on abandoned wells in
2 that area to ensure they're plugged at all depths and
3 carbon -- with carbon dioxide-resistant cement.

4 Conservation Groups propose that plume
5 stabilization be defined as a state when the carbon
6 dioxide stream that has been injected into the
7 subsurface essentially no longer expands vertically or
8 horizontally, as demonstrated by a minimum of five
9 years of -- of monitoring data.

10 They then propose that post-injection
11 site care can be redefined as appropriate monitoring
12 and other actions -- including corrective action --
13 needed following cessation of injection to ensure
14 plume stabilization has occurred and that USDWs are
15 not in danger. This change to the scope of the post-
16 injection site period would apply to the relevant
17 requirements.

18 MS. O'GRADY: Ms. Wachtman also claims,
19 at paragraph 18 of her rebuttal testimony, that "the
20 50 percent buffer is arbitrary." What is your
21 response?

22 THE WITNESS: Well, Division and
23 industry witnesses in this proceeding agree that
24 models carry uncertainty. A buffer around the ICAA
25 would incorporate this inherent modeling uncertainty

1 into the regulations.

2 MS. O'GRADY: During Commissioner
3 Ampomah's questioning of Dr. Helmi-Clark on Thursday,
4 Dr. Helmi-Clark stated that she had never seen an area
5 of review as large or larger than 10 miles. When you
6 look at the volumes of carbon dioxide the US
7 Department of Energy has projected will be injected in
8 the United States, how large would areas of review
9 have to be?

10 THE WITNESS: Well, the DOE, Department
11 of Energy, says that we will need to inject from half
12 a gigaton to nearly two gigatons of CO2 per year. So
13 this is a vast amount, thousands of times larger than
14 what's currently injected at the -- at the ADM site.

15 So depending on the basins used, if we
16 were to inject this amount, it is certainly
17 conceivable that over years, pressure cones for
18 multiple injection wells would overlap, creating
19 essentially continuous AORs, spanning tens of miles or
20 more across a whole basin.

21 MS. O'GRADY: Division witness
22 Dr. Schnaar claims on pages 17 through 18 of his
23 rebuttal testimony that the term "qualified
24 professional expert is vague, because it does not
25 establish what qualifications, credentials,

1 experience, certifications, or areas of expertise
2 would be necessary to satisfy this requirement." What
3 is your response?

4 THE WITNESS: Well, as discussed in my
5 direct testimony -- sorry, just have to look up
6 here -- as discussed in my direct testimony, the
7 modeling choices involved in area of review modeling
8 are complex, subjective, and consequential enough that
9 unqualified practitioners will make errors that put
10 underground sources of drinking water at risk.

11 In Class VI applications submitted to
12 the US EPA, it is often unclear whether a trained
13 professional built a geologic model and associated
14 reservoir simulation framework, for example, with the
15 Pratt Zero Carbon Project. Even simply specifying a
16 qualified person -- which does not imply a particular
17 certification or credential, but does imply relevant
18 experience and knowledge -- would be an improvement to
19 the existing rule language.

20 MS. O'GRADY: Ms. Wachtman objects to
21 the proposed AOR reevaluation frequency at paragraph
22 23 of her rebuttal testimony. What is your response?

23 THE WITNESS: Ms. Wachtman
24 characterizes this as my proposal. It's not. It's
25 the Division's. Nonetheless, I support it. At

1 Snøhvit -- which I'm mispronouncing, that's the
2 Norwegian word for Snow White. At the Snow-White
3 reservoir, behavior diverted from predictions within
4 the first year of injection.

5 If the initial reevaluation occurs
6 after five years, an operator would be injecting for
7 years under the assumption that its own monitoring
8 data may have already contradicted -- already been
9 contradicted.

10 MS. O'GRADY: Ms. Wachtman justifies
11 the longer interval between AOR reevaluations in part
12 by saying in her rebuttal testimony at paragraph 26
13 that "projects permitted by EPA, including Oxy's
14 Region 6 permits, operate successfully at five-year
15 intervals." On Friday, Ms. Wachtman testified that Oxy
16 does not yet have operational projects.

17 Are Oxy's pre-operational projects
18 evidence that the five-year reevaluation interval is
19 appropriate?

20 THE WITNESS: No. And Oxy's experience
21 with EOR projects isn't really relevant. First, oil
22 reservoirs are not -- are not net injections. They --
23 they remove oil and gas in larger quantities. Then
24 they cumulatively remove more oil and gas than they
25 inject CO2. So they're typically under-pressured, not

1 over-pressured.

2 Second, in an oil reservoir, they can
3 manage movement of the CO2 plume through extraction
4 from oil and gas wells, which pulls the CO2 towards
5 those wells.

6 And third, data from oil fields is not
7 public. So there's no way for the rest of us to -- to
8 assess any claims based on that.

9 MS. O'GRADY: Division and Oxy
10 witnesses object to Conservation Group's proposed AOR
11 reevaluation triggers. Ms. Wachtman claims at
12 paragraph 27 of her rebuttal testimony that these
13 triggers ignore site-specific variability and that
14 they are arbitrary and too rigid.

15 Dr. Khaniani similarly objects on page
16 9 of his rebuttal testimony that fixed, statewide
17 numerical thresholds may not be appropriate, given
18 differences between projects. What is your response?

19 THE WITNESS: I agree that the specific
20 numerical values should be site-specific, but the non-
21 negotiable principle is that thresholds must be pre-
22 specified and automatic. Because without pre-
23 specification, the question of whether an anomaly
24 warrants reevaluation becomes discretionary, judgment
25 made after the data are at hand, when the economic

1 consequences of acting are known. This is precisely
2 the problem RCRA's rules were designed to prevent.

3 MS. O'GRADY: Mr. Eales testified on
4 Wednesday that it would be very rare for a plume to
5 move outside an AOR, as AORs are regularly
6 reevaluated. Could a plume move beyond an AOR within
7 a one-to-two-year period?

8 THE WITNESS: Well, first of all, how
9 do we know it's rare? We haven't done the
10 experiments, and I don't see any reason why a plume
11 could not be moved beyond a modeled AOR in a year or
12 two.

13 MS. O'GRADY: Dr. Schnaar objects on
14 page 16 of his rebuttal testimony to a proposed
15 requirement that operators use peer-reviewed or
16 commercially-available modeling codes.

17 Specifically, he claims that such a
18 requirement would be overly-prescriptive, and would
19 attempt to codify detailed technical methodologies
20 better addressed through permit review, guidance, and
21 project-specific evaluation. What is your response?

22 THE WITNESS: Conservation Group's
23 proposal would not require the use of any particular
24 software package. It simply requires code that has
25 been independently scrutinized. A code that has never

1 been peer-reviewed or commercially validated fails to
2 give the regulator or the public a basis to trust
3 whether it correctly implements the physics.

4 MS. O'GRADY: Oxy and Division
5 witnesses object to the proposed requirement that
6 there be a minimum of four monitoring wells.
7 Dr. Schnaar objects on page 27 of his rebuttal
8 testimony that "this requirement would be overly-
9 prescriptive and may result in unnecessary costs for
10 some projects, while being insufficient for others."

11 Ms. Wachtman claims at paragraph 34 of
12 her rebuttal testimony that the number is arbitrary.
13 What is your response?

14 THE WITNESS: Well, a performance-based
15 framework without a numerical floor is
16 indistinguishable, really, from no requirement when
17 the performance objective is never quantified. Four
18 wells provides a modicum of a floor. The plume can
19 move in any four cardinal directions as well, as up or
20 down. So having at least four wells increases
21 monitoring reliability. If a project requires more,
22 they can install more.

23 Importantly, this requirement would set
24 a floor, so there's no risk of there being an
25 insufficient number of monitoring wells based on this

1 requirement. If a project requires -- oh, I think --
2 yeah, I'm done.

3 MS. O'GRADY: Dr. Schnaar also objects
4 on page 27 of his rebuttal testimony to the placement
5 of monitoring wells based on specific modeling
6 scenarios as overly-prescriptive. What is your
7 response?

8 THE WITNESS: At the ADM site,
9 unexpected migration was initially missed by
10 monitoring design for the expected plume trajectory.
11 This is exactly the outcome that placement informed by
12 worst case scenarios, it's designed to prevent. The
13 requirement is not to prescribe a specific location,
14 but to ensure the monitoring network is designed to
15 detect the scenarios that matter most, not just the
16 optimistic ones.

17 MS. O'GRADY: Mr. Eales objects on page
18 9 of his rebuttal testimony to the use of peak ground
19 velocity or peak ground acceleration as unnecessarily-
20 prescriptive.

21 Ms. Wachtman acknowledges at paragraph
22 48 of her rebuttal testimony that these are valid
23 metrics, but objects to them as not being the only
24 defensible approaches. What is your response?

25 THE WITNESS: What damages wellbore

1 cement opens leakage pathways? It's ground motion at
2 the location of the wellbore, not energy released at
3 the source of the seismic event. A magnitude-based
4 threshold can miss the damaging -- damaging event
5 while triggering -- triggering on a distant event,
6 which is why one act in the paper developed a -- a
7 PGV-based traffic light protocol specifically for
8 managing induced seismicity at injection sites.

9 I had a little bit of experience with
10 this when I was in San Francisco during the Loma
11 Prieta earthquake. Some of you may remember one
12 particular neighborhood in San Francisco was
13 devastated, while the neighborhoods around it weren't.
14 The reason was that there was a lot more ground motion
15 because of the geology of that neighborhood.

16 If the Commission believes that
17 requiring use of peak ground velocity or peak ground
18 acceleration is unnecessarily-prescriptive, an
19 alternate phasing of this requirement could be that
20 the seismic threshold metric must use peak groundwater
21 velocity, peak groundwater acceleration, or other
22 comparable -- other comparable metric approved by the
23 Division.

24 MS. O'GRADY: Ms. Wachtman testified on
25 Friday that a plume can be modeled without the use of

1 3D seismic surveying. How else would you model a
2 plume, if not with 3D seismic surveying? And what are
3 some of the risks associated with these methods?

4 THE WITNESS: Well, one way she
5 suggested is with geochemical methods to map -- map
6 out the plume using geochemical data. Now, to do
7 that, you would need a lot, probably hundreds of
8 penetrations taking water samples in the injection
9 formation. But Oxy themselves has argued -- argued
10 against putting monitoring wells in the injection
11 zone.

12 She also suggested an operator could
13 use a variety of other geophysical methods, but she
14 didn't specify any in particular. And -- and I'm not
15 aware of one that could do what 3D seismic does.

16 Finally, she mentioned the use of 2D
17 seismic monitoring. But to image the plume with 2D
18 seismic monitoring, you would need a sequence of 2D
19 profiles sufficient to capture the 3D shape of the
20 plume. And at that point, you've basically done 3D
21 seismic imaging. Yeah, I'll leave it there.

22 MS. O'GRADY: What do you think about
23 the idea of putting monitoring wells into the
24 injection zone?

25 THE WITNESS: Well, I think it should

1 give us pause when someone argues that the injection
2 zone is so corrosive and unstable that it is dangerous
3 to make breadth measurements of it. But yes, you need
4 monitoring wells to measure the pressure in the
5 injection zone. 3D seismic can monitor the plume
6 movement over time, although it still misses features
7 of CO2.

8 So you could conceivably verify the CO2
9 plume model with 3D seismic data, take it over time
10 instead of the monitoring well. But you still need a
11 set of -- of metrics ahead of time, specifically
12 arrival time in specific spots to verify the model.

13 MS. O'GRADY: Ms. Wachtman objects at
14 paragraph 50 of her rebuttal testimony to mandatory
15 DFIT tests. "Because technology evolves," she argues,
16 "mandating a specific methodology is contrary to sound
17 regulatory practice." What is your response?

18 THE WITNESS: A DFIT test is advisable
19 and should be conducted because right now, it's the
20 feasible way to measure the maximum safe pressure of
21 injection. Clearly, the maximum safe pressure -- safe
22 injection pressure is a key, if not the key, to safe
23 injection. And the DFIT is the way to measure it.

24 MS. O'GRADY: Ms. Wachtman objects at
25 paragraph 54 of her rebuttal testimony to the proposed

1 requirement that operators report all gauge
2 malfunctions and instrumentation failures within 30
3 days, as she claims "routine instrumentation issues
4 don't indicate mechanical integrity loss or USDW
5 endangerment."

6 Mr. Eales objects to this proposal on
7 pages 9 through 10 of his rebuttal testimony because
8 "the term malfunction is not defined, and could
9 encompass minor operational issues." What is your
10 response?

11 THE WITNESS: Ms. Wachtman is correct.
12 Gauge malfunctions and instrumentation failure don't
13 indicate mechanical integrity loss or drinking water
14 endangerment. Rather, when they fail, what it
15 indicates -- or what we know is that -- is that we've
16 lost information.

17 So this is a data integrity
18 requirement, and even a momentary or short
19 instrumentation failure could coincide with -- with
20 transient pressure excursions.

21 On the subject of definition of
22 malfunction, it can be defined as when no data is
23 being produced, or the data is physically implausible.
24 And I'd be fine with adding to the definition sections
25 to -- to refine this.

1 MS. O'GRADY: Ms. Wachtman objects at
2 paragraphs 59 to 60 of her rebuttal testimony to the
3 proposals requiring 24-hour reporting and shutdown for
4 gauge malfunctions exceeding one week. Her rationale
5 is that this would "generate immaterial notifications
6 and lead to unnecessary shutdowns." What is your
7 response?

8 MR. TUCKER: Madam Hearing Officer?

9 THE HEARING OFFICER: I'm sorry?

10 MR. TUCKER: Madam Hearing Officer,
11 this is Aaron Tucker. My understanding from the pre-
12 hearing order was that surrebuttal would be limited.
13 We've now approaching about 30 minutes of surrebuttal,
14 more than the time allocated for rebuttal. How long
15 are we -- can I get a ruling on how long we're
16 providing for surrebuttal here?

17 THE HEARING OFFICER: Yeah. I know we
18 discussed surrebuttal, and I think I described my
19 approach to -- so long as it is genuinely surrebuttal
20 and not just a repetition of earlier testimony, that I
21 thought it was appropriate. Let me ask Ms. O'Grady
22 then.

23 Ms. O'Grady, how much longer do you
24 believe you have?

25 MS. O'GRADY: I would suspect ten

1 minutes, but I did not anticipate that there would be
2 a time limit on surrebuttal.

3 THE HEARING OFFICER: Right. I did not
4 impose one.

5 Thank you for the question, Mr. Tucker.
6 I have been listening carefully. And so far it has
7 been surrebuttal. She's very specifically reading the
8 rebuttal to which it is surrebutting. Thank you.

9 MR. TREMAINE: Thank you.

10 THE HEARING OFFICER: Go ahead.

11 MS. O'GRADY: Thank you, Madam Hearing
12 Officer.

13 Dr. Harvey, the question was about
14 gauge malfunctions. Please proceed.

15 THE WITNESS: Well, I lost the
16 question. I'm sorry.

17 MS. O'GRADY: No worries. Ms. Wachtman
18 objects at paragraphs 59 to 60 of her rebuttal
19 testimony that the proposal requiring 24-hour
20 reporting and shutdown for gauge malfunctions
21 exceeding one week. Her rationale is that this would
22 "generate immaterial notifications and lead to
23 unnecessary shutdowns." What is your response?

24 THE WITNESS: Well, as discussed just a
25 bit ago, the concern with gauge malfunction is that,

1 during the window a gauge is malfunctioning, operators
2 and regulators lack visibility into threats.
3 Mr. Wachtman's characterization of this requirement as
4 capturing every gauge anomaly is -- is, I think, an
5 overstatement.

6 This simply places a one-week threshold
7 of how long an operator may inject without functioning
8 monitoring equipment.

9 MS. O'GRADY: Mr. Eales objects at page
10 11 of his rebuttal testimony to the proposed
11 additional circumstances that would trigger a pause in
12 cessation. He claims they are "unnecessarily-
13 prescriptive, because they limit the flexibility
14 needed to respond to the site-specific conditions that
15 may arise during operations, and also infringe on the
16 director's discretion." What is your response?

17 THE WITNESS: The automatic triggers
18 establish a floor. The director's discretion --
19 discretion to act beyond the floor is preserved. At
20 In Salah, the operator voluntarily decided to halt
21 injection when monitoring revealed dangerously-high
22 fluid pressures and land surface deformations. This
23 was a discretionary operational decision.

24 A different operator faced with
25 different economic pressures might not have made the

1 same choice, which is why pre-specified triggers
2 change discretionary safety decisions into automatic
3 ones.

4 MS. O'GRADY: Commissioner Czoski asked
5 a question on Wednesday about surface air leaks, and
6 Mr. Eales testified that a surface air leak would
7 trigger cessation of injection under 19.15.43.9 I6
8 NMAC. That portion of the rule specifies that an
9 owner or operator must cease injections when a well
10 demonstrates mechanical integrity issues.

11 If a surface air leak occurred due to a
12 leak along a fault rather than an injection well,
13 would that trigger cessation of injection? And would
14 a cessation of injection under this provision trigger
15 implementation of the emergency remedial response
16 plan?

17 And finally -- sorry, compound
18 questions -- but can you please discuss the prevalence
19 and form of leaks at natural gas storage sites in the
20 United States?

21 THE WITNESS: Yeah. So first, I think,
22 of course, any surface leak should trigger a cessation
23 of injection in the -- the emergency and remedial
24 response plan. And -- and thus, the leak is not --
25 not through a -- not necessarily through a well, but

1 could maybe through a fault, crack, or fracture.

2 Perhaps the best data we have for
3 surface leaks are -- are actually our experiences at
4 natural gas storage leaks that leak methane, another
5 buoyant gas. These are analogs to -- to CO2 storage
6 sites. You know, the British Geological Survey
7 tabulated mine leaks through geologic feature, not
8 wells -- along -- through wells, to the surface. I
9 think I'll leave it at there. I'll leave it there
10 instead.

11 MS. O'GRADY: Thank you. Ms. Wachtman
12 testified on Friday that one eddy flux tower would not
13 even cover a well pad, let alone a larger area, and
14 would thus be impractical for larger projects. Can
15 you discuss the function and utility of eddy flux
16 towers?

17 THE WITNESS: Yeah, I'm happy to
18 because I'm working with eddy flux or eddy covariance
19 towers in my research on wetlands, both CO2 and
20 methane fluxes. Now, back when I was at the CCS
21 company, we were researching the use of eddy flux
22 towers to monitor CO2 leakage from carbon storage
23 sites.

24 Back then, federal subsidies were low,
25 and we were focused on CCS as the means of reducing

1 greenhouse gas emissions. Now, the interest is more
2 in harvesting federal subsidies and oil companies are
3 driving much of it. So this is a tool that doesn't
4 come out of petroleum engineering.

5 But because we're interested in
6 reducing carbon dioxide fluxes in the atmosphere, any
7 flux towers are natural. They measure over very large
8 areas, and they measure the flux, not the
9 concentrations, like soil gas measurements.

10 So they measure what you're looking
11 for, CO2 escaping, rather than having to infer the
12 actual flux or escape -- infer flux or escape from
13 just measured concentrations. And yes, an anti-flux
14 tower usually covers an area much larger than a --
15 than a well can.

16 MS. O'GRADY: Dr. Schnaar objects on
17 pages 25 through 26 of his rebuttal testimony to the
18 proposed groundwater monitoring design and statistical
19 methods requirements as "overly-prescriptive, overly-
20 detailed for regulatory text, and potentially
21 inappropriate for some projects." What is your
22 response?

23 THE WITNESS: Well, I think, in some
24 circumstances, regulations need to be prescriptive to
25 be effective. That's why RCRA's groundwater

1 monitoring requirements -- which are developed over
2 decades of hazardous waste monitoring experience --
3 required each of these elements to be specified before
4 the permit issues.

5 This is because EPA learned that
6 leaving the statistical framework to case-by-case
7 discretion was vulnerable to post-hoc selection of
8 methods that minimized the appearance of
9 contamination. CO2 storage presents monitoring
10 challenges at least as complex as hazardous waste
11 disposal.

12 MS. O'GRADY: Relatedly, on Wednesday
13 morning, Dr. Schnaar discussed the role of guidance,
14 specifically the fact that guidance is not binding on
15 an operator. In the afternoon, he also stated that
16 "guidance offers additional flexibility that rules do
17 not." Do you think safety guardrails should be
18 mandatory?

19 THE WITNESS: Yeah. Yeah. I think
20 safety guardrails are necessary.

21 MS. O'GRADY: Dr. Khaniani objects on
22 pages 9 to 10 of his testimony that "reservoir
23 simulation models are not inherently unreliable, but
24 are instead developed using broad, site-specific data,
25 and refined through an ongoing model monitor update

1 process." "Uncertainty," he claims, "does not mean
2 unsuitability." What is your response?

3 THE WITNESS: Well, "ongoing," the word
4 that Dr. Khaniani uses suggests that, when you get
5 data conflicting with your model, you redo it right
6 away. I would support that approach because that's
7 the approach that's taken when models are expected to
8 accurately predict reality.

9 Uncertainty in reservoir model
10 prediction is well-known. Dr. Khaniani states as
11 much, acknowledging that reservoir simulation models
12 contain some level of uncertainty because subsurface
13 conditions cannot be measured directly at every
14 location.

15 Where we disagree is what that
16 uncertainty demands of the regulatory framework. In
17 petroleum engineering, model error costs the operator
18 money. The operator adjusts and continues, but
19 certainly doesn't wait years.

20 In Class VI permitting, model error
21 could mean the drinking water aquifers within the
22 actual zone of endangerment receive no monitoring or
23 corrective action, and that mistakes are only
24 discovered after contamination.

25 MS. O'GRADY: Dr. Schnaar objects on

1 page 16 of his rebuttal testimony to the proposal that
2 operators provide, with their permit application,
3 information about the fault leakage and induced
4 seismicity under anticipated changes in pressure
5 associated with injection.

6 He claims that "this information is
7 unnecessary because the existing rule already requires
8 characterization of known or suspected faults and
9 fractures as part of site characterization and area of
10 review modeling, which will consider project-specific
11 pressure." What is your response?

12 THE WITNESS: Characterization
13 identifies where faults are, but dynamic stability
14 analysis determines whether injection-induced pressure
15 changes will cause them to slip. Whether or not they
16 will slip is key to whether they can maintain --
17 whether containment of injected CO2 can be maintained.
18 To my knowledge, permit applications typically do not
19 perform dynamic fault stability analysis.

20 MS. O'GRADY: Ms. Wachtman testified on
21 Friday, in response to a question from WELC's Counsel,
22 about Oxy's proposals at 19.15.43.903A, that if
23 multiple wells were impacted, they would have to stop
24 injecting.

25 However, she expanded on this testimony

1 in response to a question from Commissioner Ampomah
2 about the same provision, that two wells in the same
3 area of review could be experiencing different
4 conditions, and that if there was no evidence of
5 mechanical integrity issues in one of the injecting
6 wells, there would be no reason to stop injecting.
7 What is your response?

8 THE WITNESS: Yes. If -- if one well
9 has mechanical integrity issues, it's true that you
10 wouldn't need to stop injection in the other wells,
11 unless they were all in danger of leaking. But I --
12 I'm not sure that's exactly the issue here. If there
13 is a risk to the USDW, then yes, multiple wells that
14 are impacting the USDW would need to be shut down.

15 MS. O'GRADY: Mr. Eales agrees on page
16 14 of his rebuttal testimony with Oxy Witness,
17 Ms. Wachtman, that a five-year review of the emergency
18 and remedial response plan is reasonable because there
19 shouldn't be significant changes in the plan that
20 would necessitate an earlier review. What is your
21 response?

22 THE WITNESS: The three-year review
23 cycle is the Division's proposal. Conservation Groups
24 support this proposal.

25 MS. O'GRADY: This ends Dr. Harvey's

1 testimony. We now move to admit Exhibits 1 through 26
2 [sic] into the record.

3 THE HEARING OFFICER: We'll pause for a
4 moment in the event there are objections to the
5 admission of Exhibits 1 through 26 [sic]. They're
6 admitted, thank you.

7 (Exhibits 1 through 25 were marked for
8 identification and received into
9 evidence.)

10 MS. O'GRADY: Dr. Harvey now stands for
11 cross-examination and questions by the commission.
12 Thank you.

13 THE HEARING OFFICER: All right. Thank
14 you.

15 Mr. Chair, how would you feel about an
16 earlier lunch break?

17 MR. CHANG: That's just fine by me.

18 THE HEARING OFFICER: All righty.
19 Let's come back at 12:30.

20 (Off the record.)

21 THE HEARING OFFICER: Let's come back
22 from the lunch break, please. We are back after the
23 lunch break. When we broke, Dr. Harvey had completed
24 his direct rebuttal and surrebuttal testimony. We'll
25 now invite cross-examination from the parties and then

1 the commissioners. Let's start with Mr. Tucker.

2 Mr. Tucker?

3 MR. TUCKER: Good afternoon. Can
4 everyone hear me?

5 THE HEARING OFFICER: Yes.

6 MR. TUCKER: All right. Thank you very
7 much. Good afternoon. Aaron Tucker on behalf of Oxy.

8 Good afternoon, Dr. Harvey. How are
9 you?

10 THE WITNESS: Good afternoon.

11 MR. TUCKER: Good. Dr. Harvey, your
12 background is primarily academic, but you did have a
13 five-year engagement with C12 Energy, a CCS company;
14 correct?

15 THE WITNESS: Right.

16 MR. TUCKER: And what were the years of
17 your engagement with C12?

18 THE WITNESS: So I think it was -- I
19 mean, it was something that I talked about with the
20 founders. I think they're frozen, but you guys can
21 hear me; right? I don't really remember when we first
22 started talking about it, but it -- it existed
23 certainly from 2008. And I was actively engaged
24 until, I don't know, 2013 or so.

25 And it may still exist. I'm not really

1 sure. It became an enhanced oil recovery company.
2 And at that point, myself and the founders kind of
3 lost interest in it.

4 MR. TUCKER: And what was your role
5 exactly with C12 Energy?

6 THE WITNESS: Well, I -- I wasn't a --
7 you know, I -- I certainly kept my job as a professor
8 at MIT, so I wasn't, you know, in any way a full-time
9 employee, but I was a -- a consultant and spent a lot
10 of time at their offices working with them.

11 MR. TUCKER: Thank you. And,
12 Dr. Harvey, it looks like I lost your video. Are you
13 able to go back on video?

14 THE WITNESS: Yeah.

15 MR. TUCKER: Okay. Thank you. Great.
16 I can see you again. Did C12 Energy ever apply for
17 any Class VI permits?

18 THE WITNESS: Well, it was -- it was --
19 around the time I was there that the rules were being
20 written for Class VI permits. So we -- we were
21 engaged in, you know, public comment on writing the
22 rules themselves. But I honestly don't remember
23 whether we got an application in before -- before we
24 left the company.

25 MR. TUCKER: Okay. You're not sure if

1 C12 ever submitted an application for a Class VI
2 permit?

3 THE WITNESS: I'm not completely sure.
4 No.

5 MR. TUCKER: Okay. But you never
6 assisted C12 with the preparation of a Class VI
7 permit; is that correct?

8 THE WITNESS: Not with submitting one,
9 but, you know, certainly assisted a lot with all of
10 the calculations and, you know, design and planning
11 that -- that go into a Class VI permit. But my role
12 was more on the technical and scientific side of it.

13 MR. TUCKER: Okay. Thank you. I think
14 I heard you mentioned that C12 shifted to enhanced oil
15 recovery. Did C12 ever apply for any Class II UIC
16 permits?

17 THE WITNESS: That would've been --
18 that -- that's about -- that's the time when I would
19 have left.

20 MR. TUCKER: Okay. And so you did you
21 ever assist with the preparation of any Class II UIC
22 permits?

23 THE WITNESS: No.

24 MR. TUCKER: Okay. Are you familiar
25 with what states C12 submitted permits to?

1 THE WITNESS: Well, like I just said,
2 I'm not quite sure whether we actually submitted a
3 permit, but we were active in a number of states. One
4 was Illinois, actually, where we were involved also
5 actually, in setting their rules about unitization.
6 And then we had mineral rights in several other
7 places. And I don't recall this much later which
8 states we'd actually -- actually purchased mineral
9 rights in, but Illinois, for sure.

10 MR. TUCKER: Okay. Thank you. Have
11 you ever worked on preparing a Class VI permit
12 application for any project?

13 THE WITNESS: Not outside of C12, no.

14 MR. TUCKER: Okay. Thank you. And
15 have you ever served as a consultant, reviewer, or
16 technical advisor to a state or federal agency
17 evaluating a Class VI permit application?

18 THE WITNESS: No.

19 MR. TUCKER: Okay. And what is your
20 firsthand professional experience with the geology of
21 New Mexico?

22 THE WITNESS: I have no firsthand
23 experience with the geology of New Mexico.

24 MR. TUCKER: Okay. Thank you.
25 Dr. Harvey, many of the articles you publish on CCS

1 argue against federal subsidies for carbon capture and
2 storage; correct?

3 THE WITNESS: The recent ones, yes.

4 MR. TUCKER: Okay. The Class VI rules
5 don't address federal subsidies or tax credits;
6 correct?

7 THE WITNESS: No.

8 MR. TUCKER: Okay.

9 THE WITNESS: I mean, I -- I think,
10 yes, that's correct. They don't address it, as far as
11 I know.

12 MR. TUCKER: Okay. Dr. Harvey, in
13 preparation of your testimony, did you review the 2010
14 Federal Register Notice for the final Class VI rule?

15 THE WITNESS: In 2010, I did not review
16 that. I think I've seen it over a decade ago.

17 MR. TUCKER: But it sounds like you're
18 familiar with that. I think you may have mentioned
19 that you were involved with C12 during kind of the
20 development of those rules?

21 THE WITNESS: Yes.

22 MR. TUCKER: Did C12 submit any
23 comments on the Class VI rules?

24 THE WITNESS: Yeah. We did. Yeah.

25 MR. TUCKER: Okay. You would agree

1 that the preamble to the final rules reflects EPA's
2 reasoning in adopting the Class VI well rules;
3 correct?

4 THE WITNESS: I'd have to read it. I
5 haven't seen it in a long time.

6 MR. TUCKER: But are you generally
7 familiar with the federal rulemaking process?

8 THE WITNESS: I'd have to say no. You
9 know, my expertise is really in the engineering and
10 technical side.

11 MR. TUCKER: So you're not aware that
12 when -- or are you aware that when EPA or another
13 agency finalizes its rules, they publish that rule and
14 an explanation in the federal register?

15 THE WITNESS: That sounds reasonable.
16 I certainly wouldn't argue with that. But if you had
17 asked me, I probably wouldn't have come out with that.

18 MR. TUCKER: Okay. Thank you. Okay.
19 I'd like to move on to some of your specific
20 proposals, if I may. You propose an expanded area of
21 review based on the pressure front; correct?

22 THE WITNESS: Yes. Expanded from the
23 area of review that's based on just the pure phase CO2
24 prediction.

25 MR. TUCKER: And in your testimony on

1 page 9, you note that kind of the pressure front
2 extending up to 100 kilometers from an injection site;
3 correct?

4 THE WITNESS: Actually, I don't recall
5 what injection site -- what the context of 100
6 kilometers is.

7 MR. TUCKER: So do you have a copy of
8 your testimony in front of you?

9 THE WITNESS: I do, yeah.

10 MR. TUCKER: Okay.

11 THE WITNESS: Take me a minute. Okay.
12 Page 9, you said?

13 MR. TUCKER: Yeah. Page 9 of your
14 direct testimony. I'm looking at kind of starting at
15 line 3. This appears to be Bates number 098, just if
16 that's easier to find.

17 THE WITNESS: Okay.

18 MR. TUCKER: And let me know when
19 you've found where I'm at.

20 THE WITNESS: Yeah, I've found it.

21 MR. TUCKER: Okay. So beginning at
22 line 3, you say "The increased pressure zone is almost
23 always substantially larger than the CO2 plume zone."
24 And then you go on to say that "A CO2 plume with
25 linear dimensions of approximately 10 kilometers can

1 generate a 0.1 MPA pressure front extending more than
2 100 kilometers"; correct?

3 THE WITNESS: Yes.

4 MR. TUCKER: There, are you talking
5 about a pressure front of 100 -- is that a radius or a
6 diameter?

7 THE WITNESS: A radius.

8 MR. TUCKER: Okay. So based on a
9 radius of a pressure front extending 100 kilometers,
10 we're talking about an area of review potentially
11 exceeding 30,000 kilometers; is that right? Square
12 kilometers?

13 THE WITNESS: Well, I'm not sure if
14 that would -- would define the area of review, whether
15 that is a sufficient increase in pressure to delineate
16 the area of review; right? That depends on whether it
17 creates an upward gradient through the confined layer.

18 The -- the main point -- sort of
19 fundamental point here, is that, when you inject water
20 into an aquifer, just kind of a mathematical thing in
21 a confined formation like this, pressures change
22 everywhere, but it -- but the pressure increase falls
23 off dramatically away from the -- from the injection
24 well.

25 So depending on how much you're

1 injecting, depending on what the elastic storage
2 parameters are of the formation, and depending at what
3 period of time -- how far in the future you look after
4 injecting for a long time -- the pressure front can
5 begin -- you know, there is pressure change
6 everywhere. You know, I should -- that's not
7 dependent. That's just a fact. What's depending is
8 how large it is at -- at which radius at which time.

9 MR. TUCKER: And I heard you talk about
10 the sufficiency. You're talking about the sufficiency
11 to endanger an underground source of drinking water;
12 is that correct?

13 THE WITNESS: Yeah.

14 MR. TUCKER: Okay. So you're not --

15 THE WITNESS: The pressure -- the
16 change -- the increased pressure is sufficiently large
17 to endanger the overlying drinking water aquifer.

18 MR. TUCKER: So just to be clear,
19 you're not advocating for an area of review based
20 simply on the pressure front; correct?

21 THE WITNESS: Well, the pressure front
22 is absolutely key to it. You want to find out
23 where -- how far away from the well -- and it's not
24 circular in the real formation because there's all
25 kinds of things going on. You want to define it by

1 where the pressures are sufficiently large to drive
2 flow into the overall -- overlying drinking water
3 aquifer.

4 MR. TUCKER: But just to be clear,
5 that's different than how far the pressure front can
6 make a change in --

7 THE WITNESS: Right.

8 MR. TUCKER: Okay.

9 THE WITNESS: Right. And I'm kind of
10 making a somewhat, you know, academic point, that the
11 pressure change itself goes very -- you know, to the
12 edge of the formation.

13 MR. TUCKER: And Conservation Groups
14 are not proposing an area of review based just on a
15 pressure change; correct?

16 THE WITNESS: Not just on that, no.
17 But that -- that's a key component of it.

18 MR. TUCKER: You're -- I think -- just
19 want to be clear. You're requiring some sufficiency;
20 right? There needs to be a sufficient change.

21 THE WITNESS: Yes. Yeah. And I don't
22 think that's in the -- I think that's in the -- the
23 existing -- it's in existing regulations.

24 MR. TUCKER: Okay. Thank you. You
25 also propose automatic triggers for area of review

1 reevaluation; correct?

2 THE WITNESS: Yeah.

3 MR. TUCKER: Okay. Would automatic
4 triggers for AOR reevaluation apply uniformly to every
5 Class VI project in New Mexico, regardless of site-
6 specific characterizations?

7 THE WITNESS: So we're advocating for a
8 floor on these, but I believe that, you know, New
9 Mexico has the -- would have -- the proposal is to
10 have the flexibility to -- to have thresholds that are
11 larger than the floor.

12 MR. TUCKER: But those floors you're
13 proposing would apply to all sites, regardless of
14 site-specific geology; correct?

15 THE WITNESS: Yes.

16 MR. TUCKER: Okay. Dr. Harvey, is it
17 true that EPA, in finalizing the Federal Class VI
18 rules expressly considered and rejected commenters'
19 request that the agency establish specific triggers in
20 the rules that would apply to other sites?

21 THE WITNESS: I don't know. As I've
22 said, I -- I really don't know the history or the
23 regulatory language. You know, I -- I'd have -- I'd
24 have to go back and look at it.

25 MR. TUCKER: Okay. So you're not

1 familiar whether EPA considered those type of
2 proposals?

3 THE WITNESS: I'm -- I'm not sure. No.

4 MR. TUCKER: Okay. And you're not sure
5 if EPA responded to those concerns in its final
6 register notice?

7 THE WITNESS: I -- I really don't
8 remember the final register notice.

9 MR. TUCKER: Okay. Thank you.
10 Dr. Harvey, you also propose requiring evaluation of
11 all pressure and chemical interactions with all other
12 operational or historic injection projects within a
13 10-mile radius; correct?

14 THE WITNESS: I would support that.
15 I'm not sure that's exactly what the language is.

16 MS. O'GRADY: Objection. Objection,
17 misstates testimony. I believe that was the Center
18 for Biological Diversity's proposal.

19 MS. RUSHING: And we would ask that
20 Mr. Tucker point to specific rule provisions, just so
21 that Mr. Harvey can know what he's supposed to be
22 responding to.

23 MR. TUCKER: Yeah, sure. Just one
24 moment.

25 So, Dr. Harvey, I'd like you to turn to

1 page 57 of your testimony. This is Bates CG-146. And
2 let me know when you're there.

3 THE WITNESS: Okay. I'm on page 57.

4 MR. TUCKER: Okay. And do you see the
5 role proposal starting at line 5?

6 THE WITNESS: Yes.

7 MR. TUCKER: That would require the
8 applicant to consider pressure and chemical
9 interactions with all other operational or historic
10 injection projects within a 10-mile radius?

11 THE WITNESS: I do. Yeah.

12 MR. TUCKER: Okay. So let me ask the
13 question again. Are the Conservation Groups proposing
14 that applicants consider pressure and chemical
15 interactions with all other operational or historical
16 injection projects within a 10-mile radius?

17 THE WITNESS: Yeah. Yeah.

18 MR. TUCKER: Okay. And this 10-mile
19 figure applies as a fixed uniform distance, regardless
20 of the specific geology of the project; correct?

21 THE WITNESS: Well, if -- I think if
22 there's a good reason to believe that another
23 injection well that's further away than 10 -- 10
24 miles, I -- I believe that the -- the regulators have
25 the discretion to include that.

1 MR. TUCKER: Sorry, would you --

2 THE WITNESS: It's not fixed to 10.
3 It -- it's more of a floor.

4 MR. TUCKER: But all sites would be
5 required to conduct this evaluation covering the 10-
6 mile radius, regardless of the size of the area
7 review; correct?

8 THE WITNESS: Yes. Yeah. You
9 definitely want -- if you have wells that are that
10 nearby, you want to evaluate how they would be
11 affected by your injection well.

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

15 THE WITNESS: You need to evaluate it.
16 It -- it'll affect your results, for sure.

17 MR. TUCKER: But it doesn't affect the
18 radius of the review; correct?

19 THE WITNESS: Right. That -- I -- the
20 proposal here is to make that a minimum.

21 MR. TUCKER: Okay. And so that that
22 review, based on radius of 10 miles, we're talking
23 about a -- that's 314 square miles; correct?

24 THE WITNESS: Yes. You would need to
25 look at other injection projects within that.

1 MR. TUCKER: Okay. Thank you.

2 THE WITNESS: I mean, I -- I trust you
3 did the pi R squared.

4 MR. TUCKER: Yeah. Pi R squared.
5 Okay. That's what we're talking about here? Okay.

6 THE WITNESS: Yeah.

7 MR. TUCKER: I'd like to move on to
8 surface air monitoring. You propose making surface
9 air monitoring mandatory rather than leaving it to the
10 director's discretion; correct?

11 THE WITNESS: Yes.

12 MR. TUCKER: Okay.

13 MS. RUSHING: Objection. I apologize.
14 We would ask again for Mr. Tucker to point to specific
15 provisions. Sorry.

16 MR. TUCKER: Dr. Harvey, could you
17 please turn to page 77 of your written testimony?

18 THE WITNESS: Okay.

19 MR. TUCKER: And I'll ask the question
20 again. You proposed making surface air monitoring
21 mandatory rather than leaving it to the director's
22 discretion; correct?

23 THE WITNESS: Yes.

24 MR. TUCKER: Are you aware that EPA
25 considered comments requesting mandatory surface air

1 monitoring in the installment of Class --

2 THE WITNESS: I think I'm vaguely aware
3 of that. That was a long time ago, but that sounds
4 reasonable.

5 MR. TUCKER: Okay. And are you aware
6 that EPA ultimately decided that surface air
7 monitoring should be at the discretion of the director
8 rather than be a mandatory requirement?

9 THE WITNESS: No. Like I've said
10 before, I really would have to go back and read these
11 old regulations.

12 MR. TUCKER: Okay. If you could please
13 turn to page 74 of your testimony. You propose -- are
14 you there?

15 THE WITNESS: Yes. Yes. Thank you.

16 MR. TUCKER: Okay. Great. Thank you.
17 You propose requiring diagnostic fracture injection
18 tests; correct?

19 THE WITNESS: I -- I think there should
20 be. I think that should be the case. Yeah.

21 MR. TUCKER: And the section you
22 recommend changing, 19.15.43 9 K6, you revise -- you
23 propose revising that provision, which discusses a
24 pressure fall-off test; correct?

25 THE WITNESS: Right.

1 MR. TUCKER: Is a DFIT test the same as
2 a pressure fall-off test?

3 THE WITNESS: No, it's more than a
4 pressure fall-off test. I mean, it's -- there is a
5 pressure fall-off when you do a DFIT test. And you
6 can definitely do a pressure fall-off test either way.
7 I mean, basically, that's how you interrogate the
8 hydraulic parameters of the formation.

9 But a DFIT test also enables you to
10 determine the -- the fracture pressure, which is sort
11 of the key -- you know, the key parameter that governs
12 how fast and how much you can inject.

13 MR. TUCKER: Just to be clear, a DFIT
14 test is not the same as a pressure fall-off test;
15 correct?

16 THE WITNESS: It -- it's more than a
17 pressure fall -- fall-off test, but it contains a
18 pressure follow-up test.

19 MR. TUCKER: Okay. And what is your
20 experience performing DFIT tests?

21 THE WITNESS: Performing them as in --
22 what do you mean performing? Like? Well, I have --

23 MR. TUCKER: Well, have you ever
24 performed a DFIT test?

25 THE WITNESS: No. I have never gone to

1 a well and operated the -- the injection equipment to
2 do that.

3 MR. TUCKER: Have you ever supervised
4 that test?

5 THE WITNESS: I've never supervised
6 one, no.

7 MR. TUCKER: Okay. And so we talked
8 about how DFIT and pressure fall-off tests are
9 different. Can a pressure fall-off test be performed
10 without fracturing the rock?

11 THE WITNESS: Yeah. You just don't
12 increase the pressure enough to fracture the rock.

13 MR. TUCKER: Okay. And a DFIT test
14 requires fracturing the rock; is that correct?

15 THE WITNESS: I think so. Yes.

16 MR. TUCKER: Okay. Can DFIT tests be
17 conducted more than -- sorry. Can a DFIT test be
18 conducted once the wellbore has been completed?

19 THE WITNESS: Completed in the sense of
20 screened and -- I'm not sure what you're asking there,
21 exactly.

22 MR. TUCKER: Once the wellbore has been
23 completed, can a DFIT test be performed?

24 THE WITNESS: Completed in the sense of
25 having like, what -- it -- it can't be completed if

1 you have something blocking flow from the wellbore
2 into the formation.

3 MR. TUCKER: So once you've started
4 in -- you know, you've drilled the well, started
5 injections, can a DFIT test be completed?

6 THE WITNESS: After you start injecting
7 CO2, I think that would probably be a bad idea for a
8 number of reasons.

9 MR. TUCKER: Okay. And why is that?

10 THE WITNESS: Well, once you start to
11 inject CO2, you would not want to fracture the
12 formation because that could create a pathway for the
13 CO2; right? The point is to -- of a DFIT test is to
14 find the injection pressure, and then use that to
15 never go above it when you're --

16 MR. TUCKER: Dr. Harvey, aren't you
17 proposing that DFIT test be conducted every five
18 years?

19 THE WITNESS: No.

20 MR. TUCKER: How so?

21 THE WITNESS: It -- it -- a DFIT test
22 is a site characterization test to find out what
23 the -- what the fracture pressure is locally. So what
24 I'm objecting to further in this testimony is using
25 results from a DFIT test that's been conducted

1 elsewhere, where the conditions might be different.

2 MR. TUCKER: So on page 74 of your
3 testimony, you were asked, "Why do you support the
4 mandating of complete DFIT tests that rely on site-
5 specific data only as shown below at 19.15.43 9K6
6 NMAC?" And then you have a proposed revision related
7 to that.

8 THE WITNESS: Yes.

9 MR. TUCKER: So just to be clear, you
10 are not advocating conducting DFIT tests every five
11 years?

12 THE WITNESS: I'm not.

13 MR. TUCKER: Okay. Thank you very
14 much. I have no further questions.

15 THE HEARING OFFICER: Thank you,
16 Mr. Tucker.

17 Ms. Gutierrez, do you have questions on
18 Dr. Harvey?

19 MS. GUTIERREZ: Good afternoon. No
20 questions from NMOGA. Thank you.

21 THE HEARING OFFICER: Thank you.

22 Mr. Pavlik or Mr. Cox? I'm not sure
23 who's on the platform.

24 MR. PAVLIK: No questions for
25 Dr. Harvey. Thank you.

1 THE HEARING OFFICER: I think I was --
2 Mr. Pavlik, it was hard to hear you.

3 MR. PAVLIK: Sorry about that. No
4 questions for Dr. Harvey. Thank you.

5 THE HEARING OFFICER: Okay. Thank you.

6 Ms. Ruscavage-Barz? She may not be
7 there.

8 Mr. Tremaine, do you have questions of
9 Dr. Harvey?

10 MR. TREMAINE: I do. Thank you.

11 Good afternoon, Dr. Harvey. My name is
12 Jesse Tremaine. I'm the legal director for the New
13 Mexico Oil Conservation Division. How are you this
14 afternoon?

15 THE WITNESS: Good. How are you?

16 MR. TREMAINE: Good. Thank you.

17 That's been a -- well, I was going to say it's a long
18 week, but it's the second week. So thank you for all
19 of your -- all of your attention and preparation for
20 the hearing.

21 I'd like to start by asking you some
22 questions about your surrebuttal testimony. During
23 your surrebuttal, Ms. O'Grady put up on a screen
24 application materials related to the Brown Pelican.
25 Do you recall that?

1 THE WITNESS: Yes.

2 MR. TREMAINE: Okay. Where is the
3 Brown Pelican project located?

4 THE WITNESS: Somewhere in Texas.

5 MR. TREMAINE: Okay. The materials
6 that were shared on screen, at what point in the
7 permitting process did you pull those materials from?

8 THE WITNESS: Well, she pulled them to
9 show me, but -- but I have seen them before. And
10 without doing a careful comparison, it seemed like the
11 permit application was the same from either the Texas
12 site or from the EPA site. But I did not, you know,
13 dig in and do, like, a comparison of files or anything
14 like that. And they were similar in the sense that
15 they had -- had a lot of redactions.

16 MR. TREMAINE: Understood. Those
17 redacted materials, are you able to clarify whether
18 those redactions occurred prior to or during the
19 public comment period related to that proposal?

20 THE WITNESS: I don't --

21 MR. TREMAINE: Sorry, you said -- not
22 to belabor. I didn't hear you correctly. Did you say
23 you don't know?

24 THE WITNESS: Oh, I -- I don't -- I
25 don't know.

1 MR. TREMAINE: Okay. Thank you.

2 THE WITNESS: I mean, I -- I've just
3 seen the file as it is.

4 MR. TREMAINE: Okay.

5 THE WITNESS: Currently on the -- on
6 the websites.

7 MR. TREMAINE: Understood. Thank you.
8 Are you aware, have you reviewed any injection well
9 permit or application for permit specific to New
10 Mexico?

11 THE WITNESS: No.

12 MR. TREMAINE: Okay. Are you aware of
13 any plume models that may already be used in New
14 Mexico?

15 THE WITNESS: No.

16 MR. TREMAINE: In preparing for this
17 hearing, did you look at any records related to Class
18 II wells in New Mexico?

19 THE WITNESS: No, I did not.

20 MR. TREMAINE: And specifically -- so
21 that would include specifically that you did not
22 review any application or permit materials related to
23 Class II acid gas injection wells?

24 THE WITNESS: I did not.

25 MR. TREMAINE: Okay. Are you generally

1 aware of OCD Form C-108?

2 THE WITNESS: No, I -- I'm certainly
3 not.

4 MR. TREMAINE: Okay. Are you aware --
5 well, on page 4 of your testimony, you talk about
6 relatively few carbon capture sequestration wells.
7 And I was just asking you about acid gas injection
8 wells, so I just want to explore your familiarity
9 there. Do you know how many acid gas injection wells
10 already exist in New Mexico?

11 THE WITNESS: I do not.

12 MR. TREMAINE: Okay. Are you aware of
13 whether or not those acid gas injection wells can and
14 do inject into saline aquifers?

15 THE WITNESS: No, but I hope they don't
16 inject into drinking water aquifers.

17 MR. TREMAINE: Understood. Thank you.
18 I want to follow up on this. You've talked, generally
19 speaking, about different permits that you reviewed.

20 And I'm hoping to clarify whether --
21 similar to the Brown Pelican example, are you
22 reviewing -- when you talk about the permits you
23 reviewed, are you reviewing materials that are part of
24 the application prior to being made available for
25 public comment, or are you reviewing materials that

1 are applicable and available for public inspection
2 once the permits are formally available for public
3 comment?

4 THE WITNESS: Okay. So first, I
5 haven't reviewed any, in any sort of official
6 capacity. It's more out of curiosity. So I have
7 downloaded them from the websites that provide them
8 for public comment.

9 MR. TREMAINE: Thank you. I'd like to
10 move on and refer back to your proposal related to
11 confidential records that are already in the public
12 record. We always ask this question. I'm sorry to
13 belabor, it's obvious, but you're not an attorney, are
14 you?

15 THE WITNESS: No, not clearly.

16 MR. TREMAINE: Okay. Are you aware of
17 whether or not the term "public record" is defined in
18 New Mexico statute?

19 THE WITNESS: I am not.

20 MR. TREMAINE: Okay. If I told you
21 that it has a specific definition, you would have no
22 reason to dispute that, would you?

23 THE WITNESS: No, because I'm not even
24 clear what that means.

25 MR. TREMAINE: Okay. So is it safe to

1 say, then, that you did not incorporate the New Mexico
2 definition of public records into this red line
3 proposal?

4 THE WITNESS: I did not, no.

5 MR. TREMAINE: Okay. So in your
6 testimony, you -- I want to get to the -- kind of the
7 heart of what you're proposing here. And I certainly
8 don't want to ask you to opine on any legal
9 significance here, but just in terms of what you are
10 trying to get at in proposing records already in the
11 public record.

12 I think you provided a couple examples
13 in your direct testimony. Can you provide some more
14 color or description of what types of information you
15 believe should be captured in that red line proposal?

16 THE WITNESS: Yeah. So most simply, I
17 want the information that was used to construct the
18 model, the -- the permit application, so that I can
19 understand how they -- how they achieved their --
20 their results, their proposal. Maybe go a little bit
21 beyond that. I would -- I would find it very useful
22 if all of the data were there that's necessary to
23 evaluate the safety of the project.

24 MR. TREMAINE: Dr. Harvey, on page 34
25 of your testimony labeled Bates CG-123, you state

1 "Confidential business information claims on
2 information already in the public record, undermining
3 the right of New Mexicans to evaluate key public
4 information that underpins the basis of a permit that
5 may irreversibly affect their water resources."

6 You go on to say that "Information
7 already in the public record often includes, but is
8 not limited to, earthquake data, well locations, and
9 well completion reports, geologic stratigraphic
10 sections, DFIT tests, and et cetera."

11 So specifically those areas that you
12 outline on page 34, are you able to point to any --
13 would you agree that those are the types of
14 information that may appear in other permits, permit
15 applications, or public records in New Mexico?

16 THE WITNESS: I think I answered before
17 that I haven't actually reviewed an application in in
18 Mexico.

19 MR. TREMAINE: Sorry, I didn't -- that
20 wasn't very clear. I'm asking if these are the types
21 of information -- whether or not you're familiar with
22 whether or not these categories of information are
23 available in other public records outside a Class VI
24 permit application?

25 THE WITNESS: So you're asking sort of

1 in general, anywhere, can this data be obtained from a
2 public record?

3 MR. TREMAINE: Well, really -- let me
4 rephrase the question. What I'm really getting at is,
5 there is already information in the public record in
6 various different forms, in OCD permitting, et cetera.
7 And I want to ask you if you're aware of any instance
8 in which data such as you have outlined here has been
9 redacted from public view in New Mexico?

10 THE WITNESS: Not in New Mexico, no.

11 MR. TREMAINE: Okay. Thank you.
12 Dr. Harvey, I want to ask about third-party
13 verifications. You're supporting an independent
14 third-party verification of certain types of
15 information. In the situation where there would be a
16 required third-party verifier, who or what entity
17 certifies that third-party verifier?

18 THE WITNESS: Well, I think actually --
19 as I said, I think, in the surrebuttal, certification
20 would be great, but actually official certification,
21 if it's not possible, would -- instead, you would just
22 choose someone who is qualified.

23 MR. TREMAINE: Okay. So do I
24 understand --

25 THE WITNESS: And --

1 MR. TREMAINE: Sorry.

2 THE WITNESS: Well, I -- I don't
3 think -- I mean, it sounds to me like that is
4 something that -- it's -- would be the discretion of
5 the regulator. And maybe there's arguments about
6 what's qualified, but I -- I think that probably some
7 agreement could be reached on that.

8 MR. TREMAINE: Okay. Dr. Harvey, would
9 any of your concerns be addressed if you were assured
10 that it was OCD's plan to contract with modeling
11 experts to perform that part of the review?

12 THE WITNESS: Yeah, I would like them
13 to do that.

14 MR. TREMAINE: I have a couple weedy
15 questions here, Dr. Harvey, so bear with me. On page
16 10, line 17 of your direct testimony -- which is
17 marked as Conservation Groups 99 -- you state "If the
18 regulations define only a single zone by which to
19 guide regulations, operators will have an incentive to
20 use smaller plume-based boundary -- the smaller plume-
21 based boundary -- leaving a much larger pressure zone
22 outside the regulatory perimeter."

23 Dr. Harvey, is there anything in the
24 proposed -- in the New Mexico proposed regulations
25 that would require only a single zone?

1 THE WITNESS: I'd -- I'd have to read
2 the regulations, but I -- I think the -- the -- I
3 think the context here is that you need to have it
4 defined by both the area of CO2 plume and the -- and
5 the pressure increase.

6 MR. TREMAINE: Would you agree that, if
7 New Mexico relies on the EPA guidance, that both
8 zones, pressure and plume would be considered in an
9 AOR delineation?

10 THE WITNESS: Oh, I'm sorry. What's
11 the question?

12 MR. TREMAINE: Would you agree that, if
13 New Mexico relies on the EPA guidance, that both the
14 pressure and plume zones would be considered in an AOR
15 delineation?

16 THE WITNESS: I'd have to read the
17 guidance. I -- I hope that's the case, yes.

18 MR. TREMAINE: Okay.

19 THE WITNESS: I'd have to read them.

20 MR. TREMAINE: Similarly, on page 12,
21 line 5 of your direct testimony, you state that "If an
22 operator delineates the AOR based primarily on the
23 flume footprint rather than the pressure front --
24 which is possible under Class VI regulations, because
25 the AOR is defined only in the Division-proposed

1 regulations as the region surrounding the geologic
2 sequestration project where USDWs may be endangered by
3 the injection activity -- the result will
4 underestimate the area of potential endangerment."

5 So my understanding from your testimony
6 is that you agree that elevated pressures endanger
7 USDWs; is that correct?

8 THE WITNESS: Yes.

9 MR. TREMAINE: Okay. If, as you agree,
10 the area of elevated pressure endangers USDWs, then,
11 referring back to the part of your testimony that I
12 just referred to, how does the proposed regulatory
13 language preclude consideration of the pressure front?

14 THE WITNESS: Well, I -- I hope it
15 doesn't. I think, you know, the -- the point here is
16 that it -- it should include the pressure front.

17 MR. TREMAINE: Okay. So, Dr. Harvey,
18 I'm referring generally to page 14 of your direct
19 testimony. I think it's -- I believe it's a fair
20 characterization to say that you address model
21 uncertainty at some length. Ultimately, do you agree
22 that computational models informed by all available
23 data are the best available method to determine the
24 likely plume and pressure front areas?

25 THE WITNESS: It's the only way to

1 predict it into the future, but it is entirely
2 dependent on the -- on the data that's used to
3 construct it. And I'm not sure the context here, but,
4 you know, it is the only way, in conjunction with
5 ongoing recalibration with -- with data as it becomes
6 available.

7 MR. TREMAINE: Thank you. So,
8 Dr. Harvey, you bring up the ADM -- the Archer Daniels
9 Midland case -- in the context of AOR delineation.
10 I'm referring to the page 15 of your direct testimony.
11 Would you agree that the monitoring well with the
12 potential leakage was within the site's AOR defined by
13 modeling?

14 THE WITNESS: Actually, I'm not quite
15 sure that I -- I -- if -- that -- that could well be
16 the case.

17 MR. TREMAINE: Okay. Do you agree that
18 the purpose of AOR modeling is to define the area
19 where leakage could occur?

20 THE WITNESS: Where leakage of CO2
21 could go through the overlying caprock, yeah.

22 MR. TREMAINE: Yes? Okay. Okay. So
23 if the leakage occurred within the AOR, then in the
24 Archer Daniel Midland context, the AOR was actually
25 correct?

1 THE WITNESS: Yeah. The -- if -- if --
2 that -- that's right. Laterally. The -- I think
3 maybe -- if I could expand a little bit on something
4 and -- it was in my direct. Where the models failed
5 was in how quickly the CO2 moves upward.

6 And that's an example of -- of a lot --
7 you know, these are -- it's pretty -- that site has a
8 lot of sophisticated modeling. Yet, it was unable to
9 predict the rapid movement of the CO2 upward from the
10 injection depth.

11 MR. TREMAINE: Thank you. Dr. Harvey,
12 on page 30 of your direct testimony, you refer to the
13 offered amendments that you state are needed to ensure
14 that the PISC, post-injection -- well, I'll say the
15 PISC monitoring because I always get that one wrong.
16 But the PISC monitoring does not end until plume
17 stabilization ceases based on actual data.

18 Are you aware that the proposed New
19 Mexico regulations already state that, and I quote
20 "Prior to authorization for site closure, the owner or
21 operator must submit to the director for review and
22 approval a demonstration, based on the monitoring of
23 the site-specific data that no additional monitoring
24 is needed to ensure the geological sequestration
25 project does not pose an endangerment to USDWs." Are

1 you aware of that?

2 THE WITNESS: Again, well, I -- I don't
3 remember the precise language, but I mean, the -- it's
4 discussed in there for sure.

5 MR. TREMAINE: Okay. For clarity in
6 the record, I'm referring to proposed item 19.15.43
7 9N2C. Does that language, Dr. Harvey, not address the
8 concern that you bring up?

9 THE WITNESS: Well, one part of the
10 concern is, how long do you wait to establish that
11 it's stabilized? And the language you read doesn't --
12 does not specify that, I believe.

13 MR. TREMAINE: Okay. Thank you. Bear
14 with me, Dr. Harvey. I'm looking through. You've
15 answered some of my questions, so I'm trying to move
16 through without repeating any of these areas.

17 At a high level, Dr. Harvey, do -- you
18 referenced EPA Class VI guidance in your direct
19 testimony. Do you agree at a high level that those
20 guidance documents contain helpful protocols?

21 THE WITNESS: You know, again, I -- I
22 have not -- I can't recall the language in the EPA
23 regulations or guidance.

24 MR. TREMAINE: Okay. Dr. Harvey, can
25 you agree that, at a high level, when we're talking

1 about a rulemaking context, it's necessary to strike a
2 balance between prescriptive requirements and project-
3 specific determinations?

4 THE WITNESS: Yeah, I -- I agree that
5 there should be a balance.

6 MR. TREMAINE: Okay. And in terms --
7 do you agree that modeling methods, monitoring
8 technology, logging technologies, that these
9 technologies have and will likely continue to evolve
10 over time?

11 THE WITNESS: Well, everything does, so
12 hopefully they do. But right now, if a project were
13 to commence, it should use the -- the ones that are
14 appropriate and best currently.

15 MR. TREMAINE: Okay. Thank you. I
16 asked you a couple questions about the ADM context,
17 and then I believe what you said was that the model
18 failed in predicting how quickly the CO2 moved upward.
19 Dr. Harvey, was the -- the transmission pathway in the
20 ADM context was a monitoring well; correct?

21 THE WITNESS: I don't know.

22 MR. TREMAINE: Okay.

23 THE WITNESS: The monitoring well was
24 degraded and measured CO2, and then it's inferred that
25 it was a transmission pathway.

1 MR. TREMAINE: Okay. Thank you. Do
2 you agree that each injection zone monitoring well is
3 a potential leakage pathway?

4 THE WITNESS: Potentially, it is, if
5 the well -- if the well fails.

6 MR. TREMAINE: Okay. And so --

7 THE WITNESS: But let me add to that.
8 If -- if the well is constructed correctly, I think we
9 can have some reasonable confidence that it won't --
10 won't fail.

11 MR. TREMAINE: Right. So would you
12 agree, then, that when we're talking about monitoring
13 wells and gathering data and leakage pathways, that it
14 becomes necessary to weigh or balance needs for data
15 and the creation of more potential leakage pathways on
16 a site-specific basis?

17 THE WITNESS: Yeah, you need to weigh
18 it. You -- I'm not too worried about too many
19 monitoring wells. They're very expensive to put in.
20 I'm more worried about an insufficient number of
21 monitoring wells.

22 MR. TREMAINE: Okay. So, Dr. Harvey,
23 this one is a pretty weedy one, but on page 52, you
24 recommend -- or you refer to simple scaler factor. In
25 your expertise, your understanding, is that a

1 commonly-understood term?

2 THE WITNESS: So which line are you
3 looking at?

4 MR. TREMAINE: I'm looking at page 52,
5 line 10. It's Bates Conservation Groups 141, which is
6 also page 145 of the PDF packet, if you're --

7 THE WITNESS: Well, I mean, it's
8 certainly well-used in science and engineering
9 broadly. It just means -- okay. It -- it's maybe a
10 little too sophisticated, saying it's a scaler. It's
11 just a multiplier.

12 MR. TREMAINE: Okay. Well, the
13 question I'm getting to is that if that is included in
14 the regulations, if you were to define that, are you
15 able to provide an I -- recognize this is difficult on
16 cross-examination, but what would your definition of
17 simple scaler factor be?

18 THE WITNESS: Let me just take a look
19 at language here. It would just be a multiplier.

20 MR. TREMAINE: Okay. Thank you.

21 THE WITNESS: I mean, a -- a multiplier
22 on the -- on the distance from the injection well.

23 MR. TREMAINE: Thank you.

24 Dr. Harvey -- and thank you, moving through. I had a
25 lot of questions for you, but you've covered some of

1 them. So please continue to bear with me.

2 Dr. Harvey, you referenced well
3 searches in your direct testimony. For instance, on
4 page 62, line 7, and that's Bates Conservation Groups
5 151 -- and I'll paraphrase for the premise of the
6 question here. But you rely on studies in the
7 Illinois Basin and Pennsylvania and Oklahoma.

8 Are you able to speak to the
9 similarities or differences between the presence
10 records and the depth of artificial penetrations and
11 how they differ in the San Juan and Permian compared
12 to those other locations that you referenced?

13 THE WITNESS: Yeah, I think I'd be
14 speculating. I -- I don't -- I don't remember all the
15 details.

16 MR. TREMAINE: Okay. Thank you. On
17 page 70, you recommend additional requirements
18 regarding testing and monitoring. And are you -- it's
19 page 70, line 12. Are you aware of the need for a
20 quality assurance and surveillance plan for all
21 testing and monitoring requirements in the proposed
22 rule language at 19.15.43 8K13?

23 THE WITNESS: I think I'm aware of
24 that, but again, I don't remember the specific
25 language.

1 MR. TREMAINE: Okay. Are you generally
2 familiar with QASP, quality assurance and surveillance
3 plan?

4 THE WITNESS: In -- in general, I think
5 I know what -- what that means, but -- yeah.

6 MR. TREMAINE: Okay. Would you agree
7 that a project-specific QASP would define the data
8 requirements that you're recommending?

9 THE WITNESS: This is applied to which
10 data?

11 MR. TREMAINE: I'm referring back to
12 the additional requirements regarding testing and
13 monitoring that you proposed on page 70. So this
14 is -- it's 163 of the PDF, Bates CG-159.

15 THE WITNESS: Okay. And what's the
16 question again?

17 MR. TREMAINE: I'm trying to get at
18 whether or not a project-specific quality assurance
19 and surveillance plan would define the specific data
20 requirements that you were recommending in the
21 proposed edit.

22 THE WITNESS: Whether it would -- if it
23 was written specifically to do that?

24 MR. TREMAINE: Sorry, was that a
25 question?

1 THE WITNESS: Yeah. Yes. Whether
2 it -- whether it does as-written, or whether it could
3 if it was written with this amendment in mind?

4 MR. TREMAINE: Would it be normal --
5 yeah, I'll try to rephrase. Would it be normal that a
6 project-specific quality assurance and surveillance
7 plan would address the testing and monitoring
8 requirements that you included in this section?

9 THE WITNESS: Oh, okay. So I think,
10 you know, that plan should have specific aspects for
11 the types of data that -- the types of monitoring and
12 data that is collected.

13 MR. TREMAINE: Okay. I have to direct
14 you to page 73, line 11 of your testimony. One
15 moment. I'm verifying that line here. Okay. So,
16 Dr. Harvey, starting on line 11, you state that "these
17 are the right principles, but the guidance specifies
18 no minimum, leaving data density to operator
19 discretion."

20 And what I'm getting at here is, will
21 you agree, that under the proposed rule, those
22 discretionary items are director discretion, not
23 operator discretion?

24 THE WITNESS: I -- I'd really have to
25 read the precise language of the rule. I know that

1 the director has discretion.

2 MR. TREMAINE: Okay. If items such as
3 this actually were director discretion, does that
4 address your concern at all?

5 THE WITNESS: I would prefer if there
6 is some statistical rigor that sets a floor. And, you
7 know, for -- I think, you know, in the context of
8 monitoring in water chemistry, if there's a frequency
9 that sets a floor.

10 MR. TREMAINE: Thank you. I think that
11 I am wrapping up, Dr. Harvey. Just give me one second
12 to make sure that is true. And that is true. Thank
13 you for your time. I don't have any further
14 questions.

15 THE HEARING OFFICER: Okay. Thank you,
16 Mr. Tremaine.

17 Commissioner Ampomah, would you like to
18 go? Oh, I forgot redirect.

19 MS. O'GRADY: I'm sorry, Madam Hearing
20 Officer.

21 THE HEARING OFFICER: Oh, redirect.
22 Very sorry.

23 MS. O'GRADY: I just have a few quick
24 questions.

25 Dr. Harvey, do you need to have an in-

1 depth knowledge of the geology of New Mexico to have
2 relevant expertise in the science behind Class VI
3 injections?

4 THE WITNESS: No, you do not. And
5 the -- the examples that I refer to are from all over
6 the world. And the -- the sort of lessons of those
7 examples will apply in New Mexico, as they would
8 anywhere -- anywhere else.

9 MS. O'GRADY: Although you discussed
10 the importance of DFIT tests in the context of
11 pressure fall-off tests, just to clarify, Conservation
12 Group's red lines do not explicitly require a DFIT
13 every five years or otherwise?

14 THE WITNESS: Yeah. That -- we just
15 read that and that -- that looks like that's right.
16 Yeah.

17 MS. O'GRADY: Did you state that the
18 Class VI project documents you've reviewed have been
19 downloaded from the website, where those documents are
20 provided to the public during the public comment
21 period and after?

22 THE WITNESS: I'm pretty sure. I've
23 never had any access that the public wouldn't have.

24 MS. O'GRADY: And Mr. Tremaine stated
25 that EPA guidance recommends modeling the AOR on both

1 plume and increased pressure. If EPA guidance is not
2 binding, would an operator be required to incorporate
3 both the plume and increased pressure?

4 THE WITNESS: I think that's my
5 understanding of how these regulations work, that if
6 it's EPA guidance, you don't have to do it; right?

7 MS. O'GRADY: Thank you.

8 THE WITNESS: Yeah.

9 MS. O'GRADY: Yeah. I have no further
10 questions. Thank you so much.

11 THE HEARING OFFICER: All right. Thank
12 you.

13 Commissioner Ampomah, would you like to
14 begin the questioning? We'll need to take a break in
15 about 20 minutes or so.

16 MR. AMPOMAH: I promise I'll be fast.

17 Thank you so much, Professor Harvey,
18 for your testimony to support this application to make
19 it much better. So I do appreciate your testimony to
20 us. Now, I'll go through the rule with the red lines,
21 and some of it has already been covered. So I'll
22 probably spend time on those. So I'll be moving
23 through that quickly.

24 Now, but let me first ask about the
25 third-party verification of the modeling. Now, a

1 quick question that I have for you is, who has the
2 final determination when there's a disagreement
3 between a third party, the operator, and then also the
4 regulator?

5 THE WITNESS: I think that's a good
6 question. Can I answer that by saying that that's
7 what I would hope those writing the regulations can --
8 you know, can -- can cover -- can specify? I --
9 I don't know how best to -- to write the regulations
10 to do that, but -- but I -- I understand that, you
11 know, you need -- you need some mechanisms for that.

12 MR. AMPOMAH: Now, so with that, when
13 you say that we should make it more of a mandatory
14 part of the rulemaking, don't you believe that it
15 could probably substantially debate permitting without
16 materially improving the technical quality of the
17 application?

18 THE WITNESS: Well, I think the -- my
19 motivation for it is -- is to prevent the bad models
20 from getting through. So I'm -- I'm concerned more
21 with, if you don't do this, you can end up with --
22 with bad outcomes, with areas of review that are too
23 small. And in the worst case, with CO2 escaping all
24 the way to the surface.

25 MR. AMPOMAH: Yeah. You know, I don't

1 want to go much deeper on this with you, but I would
2 have done so if you have experience in reviewing some
3 of these EP applications. You know, because if you
4 review --

5 THE WITNESS: Yeah.

6 MR. AMPOMAH: Okay. Go ahead.

7 THE WITNESS: Well -- well, I think --
8 okay. I see where you're going. Yeah. So, you know,
9 again, I haven't reviewed these things in an official
10 capacity, but I can say the ones I've looked at, I
11 could not review. You know, it's -- there's just not
12 enough information there.

13 And -- and it -- you know, it is --
14 you're right. It's a lot of work. And, you know, I'm
15 not going to do that unless -- unless I were sort of
16 employed as a -- as an outside expert.

17 MR. AMPOMAH: Now, just to give you a
18 fair idea, to get your thoughts with regards to the
19 rigorous -- the rigorosity of the review process. So
20 the example that you showed, that your -- that your
21 counsel showed, there, we see a lot of redactions in
22 there.

23 I don't know if you could crosscheck
24 that to see the number of revisions that that
25 particular application has gone through. If I recall

1 correctly, I saw number three. I don't know if you
2 can confirm that.

3 THE WITNESS: No. I just downloaded
4 earlier before they showed it to me. I did take a
5 look at it and I downloaded it from both the EPA and
6 the Texas site, the permit application.

7 MR. AMPOMAH: Yeah. So if you have a
8 copy of it, look at the header and see the revision.
9 You will see that, if what I saw is correct, that it
10 has undergone revisions. And that would be the tag
11 one that you -- that you showed us.

12 THE WITNESS: Okay. Yeah, that -- that
13 could be the case.

14 MR. AMPOMAH: Now, I asked you a
15 question with regards to who has the final
16 determination as to whether, when there's a
17 disagreement between, let's say, the parties that are
18 reviewing the applications. Do you know that in the
19 current rule, it will be the director who has the
20 ultimate deciding power to say, "This is what we are
21 going for"?

22 THE WITNESS: Do I know if that's in
23 the current rule? No, I -- as I said, I do not have
24 all of these rules at my fingertips, but that sounds
25 reasonable.

1 MR. AMPOMAH: Yeah. Let's go through
2 the rule. And I'm looking at CG -- on page CG-017.
3 And this will be 19.15.42 NMAC. So I'm looking at the
4 binder, CG-017. Now, let me know --

5 THE WITNESS: Okay. That's -- I'm
6 sorry. Is that in my direct testimony? No.

7 MR. AMPOMAH: This one is going to be
8 in your -- in the packet that we have.

9 THE WITNESS: Yeah.

10 MR. AMPOMAH: Yeah. So this would be
11 the rules of Exhibit --

12 THE WITNESS: Yes.

13 MR. AMPOMAH: Okay.

14 THE WITNESS: Yeah.

15 MR. AMPOMAH: This would be Exhibit 1-
16 A, I believe. Yeah. So I'm looking at the
17 transitioning from Class II to Class VI. That would
18 be the last sentences there on that page.

19 (Exhibit 1-A was marked for
20 identification.)

21 THE WITNESS: Okay.

22 MR. AMPOMAH: Now, you've made some
23 edits here, but I just want to ask, with or without
24 your edits, do you believe that your intent is still
25 captured in this provision?

1 THE WITNESS: Yeah, I think I see what
2 you're asking. I'm having to read it sort of, you
3 know, ignoring the red and ignore -- and read it with
4 just the black. And it's pretty similar both ways.

5 MR. AMPOMAH: Okay. And that's what I
6 thought, too. So thank you. If we flip to the next
7 page, that would be CG-018. And you are proposing
8 that we do have -- we do add additional statement in
9 there. That would be F, "integrity of the caprock
10 seal for long-term contamination." And I'm not saying
11 that -- OCD more or less agrees with you on this one.
12 But my question to you is, how will this be
13 quantified?

14 THE WITNESS: Well, the -- the main
15 method that -- that I'm proposing is that you do
16 quantitative models of how faults in the particular
17 geometry at your site respond to increased pressures.
18 So it's not a question so much of whether the caprock
19 has integrity before you inject. My question is, how
20 does it behave after you perturb the system by
21 injecting?

22 MR. AMPOMAH: Yeah. So if you look at
23 that provision -- the whole number 2 provision -- it's
24 more or less giving some guidelines to the director to
25 make a decision as to whether a Class II now needs to

1 apply for a Class VI. So these are provisions that
2 the director has to use that as a guidance to make
3 that determination.

4 So I'm still -- I'm still trying to
5 figure out how the director is going to more or less
6 make a determination whether a reservoir that has
7 undergone pressure maintenance, you know, how he's
8 going to more or less -- the director is going to more
9 or less evaluate the integrity of the caprock without
10 the applicant going through the Class VI application
11 process.

12 THE WITNESS: Yeah, I think -- so in --
13 I would -- the answer I just gave was sort of a more
14 broad, like, how do you interrogate the integrity of
15 the caprock in general? For the transition, I -- I
16 see your -- I agree. If it's a -- if it's a
17 wastewater injection well, then it has not been
18 evaluated for buoyant CO2 coming into it. And I don't
19 see any way that that isn't just basically the same as
20 creating a Class VI well. And so it should be
21 evaluated that way.

22 If it's an EOR injection well, you
23 know, there already is, presumably, an intact caprock.
24 That's why there's oil and gas there. But the -- the
25 conditions could change a lot. So you need to

1 evaluate under the changed conditions, which would
2 typically be increase in pressures beyond what the oil
3 reservoir has ever seen because they're not pumping
4 oil out anymore. You're just injecting CO2.

5 Oh, also, you know, it -- it -- could
6 spread much further; right? Because instead of
7 drawing it to -- drawing the injected CO2 towards your
8 production well, it could go in other directions once
9 the production wells are no longer turned on.

10 MR. AMPOMAH: So you made a good
11 point -- or at least -- you made a point about, the
12 director can use the changes in the reservoir pressure
13 to make that determination; right? But so that one is
14 captured under A.

15 I'm still trying to figure out, without
16 going through the application process, how the
17 director is going to be able to more or less assess
18 the integrity of the caprock. I'm still trying to
19 figure that out.

20 THE WITNESS: Yeah. Yeah. I mean, the
21 answer I just gave is that, going through the
22 application process would be the straightforward way
23 to do it.

24 MR. AMPOMAH: Exactly. So but you see,
25 if you look at that number 2, it is the point for the

1 director to make the decision to go to ask for a Class
2 VI. You know, so at that point --

3 THE WITNESS: Yeah.

4 MR. AMPOMAH: They don't have the
5 information. The director doesn't have the
6 information.

7 THE WITNESS: Right. Yeah.

8 MR. AMPOMAH: So you see why -- I feel
9 like probably this would be something that the
10 director cannot really achieve if we leave that in the
11 rule.

12 THE WITNESS: I -- I agree with you.
13 And -- and I could even maybe support what you're
14 saying. It's that, if you turn the question around
15 and say, under what transition, in what circumstances,
16 would the director look at it and say, "Oh, that's
17 fine." I'm hard-pressed to come up with what that
18 would be.

19 MR. AMPOMAH: Yeah. So you see that
20 it's not a clear-cut provision for the director to
21 really follow compared to all the other ones. Those
22 ones are really easy for the director to really even
23 make that determination. So even though I do know
24 that --

25 THE WITNESS: So I would be happy -- my

1 opinion is -- is if you -- if you can simplify the
2 whole thing and say, "You have to do a Class VI
3 application."

4 MR. AMPOMAH: Yeah. Okay. Thank you.
5 Let's go to Exhibit 1-C.

6 (Exhibit 1-C was marked for
7 identification.)

8 MR. AMPOMAH: Do you need to take a
9 break?

10 THE HEARING OFFICER: Whenever is fine.

11 MR. AMPOMAH: Okay. Just let me know.

12 THE HEARING OFFICER: Okay.

13 MR. AMPOMAH: Thank you.

14 Let's go to Exhibit 1-C of your
15 testimony. So this will be -- but I want to start
16 with the CG-031, page 31. And that would be page 4 of
17 your rule. So you --

18 THE WITNESS: Okay.

19 MR. AMPOMAH: Are you there?

20 THE WITNESS: Oh, I'm sorry. I'm
21 typing up. No, I'm not. What -- can you give me
22 the -- the address of it again?

23 MR. AMPOMAH: CG-031.

24 THE WITNESS: Okay. Yes.

25 MR. AMPOMAH: Yeah. So I'm looking at

1 section 9, paragraph 9, where you are defining
2 intensive corrective action area. So my first
3 question on this is, is this a typical technology that
4 is really used in Class VI or even subsurface
5 modeling?

6 THE WITNESS: So the technology or
7 the -- the definition of the term?

8 MR. AMPOMAH: The definition of the
9 term.

10 THE WITNESS: Oh, okay. I don't know.
11 I don't know if it's in other states' regulations.

12 MR. AMPOMAH: Have you seen any of the
13 states that do have primacy now incorporating this
14 definition in their rule?

15 THE WITNESS: No, I -- I'm sorry. I
16 just have not read the regulations of all the states
17 in the EPA.

18 MR. AMPOMAH: And this is -- so how did
19 you come up with that definition, though?

20 THE WITNESS: Well, it's the -- it's
21 the area above which pure phase CO2 could -- could
22 move straight upwards.

23 MR. AMPOMAH: And is that not captured
24 in the AOR?

25 THE WITNESS: Yeah. It's the -- it's

1 the -- one part of the AOR.

2 MR. AMPOMAH: So my question to you is,
3 the AOR captures that. So if we take out this
4 definition -- if the commission decide not to adapt
5 this definition, it is still some way, somehow
6 captured under the AOR. Would you agree with me on
7 that?

8 THE WITNESS: Yeah. Yeah. If you
9 write the language so that it's consistent across
10 both. I mean, I think sort of obviously, you know,
11 anything we call intensive correction action should be
12 within the AOR.

13 MR. AMPOMAH: Okay. Now, with regards
14 to the plume stabilization, so that one, too -- don't
15 you believe that that one is captured as part of the
16 AOR?

17 THE WITNESS: No, because it's the
18 question -- plume stabilization describes when the
19 plume has stopped moving.

20 MR. AMPOMAH: So what type of plume are
21 you referring to? Is it the pressure plume or the CO2
22 plume?

23 THE WITNESS: It's the CO2 plume.
24 The -- the pressure plume is -- or pressure field is
25 presumably decaying after you stop injecting, but the

1 plume can still migrate some somewhere else.

2 MR. AMPOMAH: Now, is it your testimony
3 that, let's say, we have to account for the plume
4 stabilization as part of the PISC?

5 THE WITNESS: I think that's -- I think
6 that's right in that you want to confirm that the
7 plume is stabilized before you make any decisions
8 on -- on how to -- how to monitor, you know, post-
9 injection.

10 MR. AMPOMAH: Now, would you agree with
11 me that, in most instances, your pressure front will
12 be more or less at the distance compared to that other
13 CO2 plume?

14 THE WITNESS: No, I -- I think it
15 extends further. The -- the CO2 is displacing water;
16 right? And so it necessarily increases the pressure
17 of the water it's displacing.

18 MR. AMPOMAH: So definitely the
19 pressure front is going to be much bigger compared to
20 that of the CO2 footprint?

21 THE WITNESS: Right. Yeah.

22 MR. AMPOMAH: So now in a PISC, the
23 current rule, or even the normal way we look at Class
24 VI applications, don't you believe that that is the
25 reason why the pressure -- depending on how you define

1 the AOR -- that becomes the center piece as to when --
2 or let's say that becomes the center piece of the
3 PISC.

4 THE WITNESS: What becomes the center
5 piece? The -- the pressure?

6 MR. AMPOMAH: How you define the AOR.
7 Either pressure or let's say the bloom, it becomes the
8 central piece of the PISC.

9 THE WITNESS: Yes. I mean, you -- you
10 need to define the area over which you're still
11 concerned, or over which it's plausible that -- that
12 the overlying aquifer will be contaminated, or that
13 CO2 will escape all the way.

14 MR. AMPOMAH: Let's go to CG-032. So
15 that'll just be the next page. Give me a second.
16 Now, so here you are adding some languages, you know,
17 some -- yeah, just a clarification language to, let's
18 say, CII, and then CV. Now, my question is, will this
19 provision still be understood without the additions?

20 THE WITNESS: Yeah, I think under II --
21 under II, the addition there is whether the increased
22 fracture -- pressure causes fractures to slip or open,
23 changes the geomechanics.

24 MR. AMPOMAH: Yeah. But my concern
25 there is the term "under anticipated changes." Can

1 you explain that a little bit more?

2 THE WITNESS: Well, you know, the only
3 way that we predict changes is through the modeling.
4 And so the -- the question is, under the anticipated
5 changes, the ones that we predict with the model,
6 would -- would these fractures slip or open? Would
7 something mechanically happen to the -- to the
8 caprock?

9 MR. AMPOMAH: Let's go to page CG-034.
10 Now, so I'm looking at 3A, and I want you to read
11 through that carefully. The suggested language that
12 you are putting across. Yeah, I want you to review
13 that carefully. And my question to you will be, is
14 injection into USDW accepted under the proposed rule?

15 THE WITNESS: Okay. Well, I -- I hope
16 not. I -- I think what we're talking about there is
17 injection into the injection formation.

18 MR. AMPOMAH: Yeah. So if you read
19 through the last part, you're saying that "calculate
20 the area over which induced pressure differentials
21 could drive movement of formation fluids." And then
22 you bring in all injected fluids into the USDW. So
23 are you referring that it is moving from the injected
24 zone, or directly into the USDW?

25 THE WITNESS: No, it would be moving

1 from the injected zone.

2 MR. AMPOMAH: Okay. Okay. Now, so if
3 we go to the II, just beneath that, you are proposing
4 something here that I really need some more
5 explanation on. So here, you are saying that "be
6 based on detailed geologic data collected from at
7 least three wells." Do you believe that three wells
8 is enough to characterize a storage complex?

9 THE WITNESS: No, I would want more.
10 You know, this is setting it as a floor. It certainly
11 would be in conjunction with seismic data.

12 MR. AMPOMAH: So then this bring up an
13 important question that Mr. Tremaine asked you about
14 your familiarity with the San Juan Basin and then the
15 Permian Basin.

16 Do you believe that an operator will
17 use only three wells in the San Juan Basin or the
18 Permian Basin to do a full characterization of a
19 storage complex?

20 THE WITNESS: Well, I -- you'd have to
21 tell me what storage complexes have been fully-
22 characterized. In oil reservoirs, there are a lot
23 more wells than that.

24 MR. AMPOMAH: Then I'll define the
25 storage complex as the confining zone, the injection

1 zone, and then the confining zone beneath the
2 injection zone.

3 THE WITNESS: Okay. But I think your
4 question sort of assumes that this has been done
5 enough to say something like, you know, typically you
6 need more than three wells. I'm not -- I'm not aware
7 of these characterizations for geologic storage.

8 MR. AMPOMAH: Now, this will be --

9 THE WITNESS: Other than the -- you
10 know, the permit -- the -- like, the permit we just
11 looked at.

12 MR. AMPOMAH: I mean, this will be --
13 because if the commission is to adapt your language
14 here, this would be something that I will say, I
15 definitely need someone with experience in the San
16 Juan Basin or the Permian Basin to really put this up.
17 I mean, if I ask you, do you know how many wells?

18 THE WITNESS: Right. Right. Okay. So
19 this is a floor. You know, if you get good geologic
20 advice on a particular site, you might find that the
21 structure there is complex enough, and the
22 heterogeneity and hydraulic parameters is strong
23 enough, that you conclude three wells isn't nearly
24 enough.

25 MR. AMPOMAH: So then you agree with me

1 that we do not necessarily have to declare explicitly
2 saying that at least you have to use three wells,
3 because it's going to be basing site-specific. Would
4 you agree with me?

5 THE WITNESS: The one disagreement I'd
6 have is, I'd hate to see it be one well or two wells,
7 because I can't imagine a place where that's
8 sufficient.

9 MR. AMPOMAH: Well, so that is why I
10 was saying that, if you have a lot of experience in
11 the San Juan or the Permian, probably this would be a
12 different suggestion to the commission. You know,
13 because if you look at San Juan, for instance, I mean,
14 you do have salt water injection wells already drilled
15 into the potential formation that could be utilized
16 for --

17 THE WITNESS: Oh, okay.

18 MR. AMPOMAH: Yeah. So you don't --

19 THE WITNESS: So you could -- you could
20 use existing wells and not have to install so many new
21 wells if the existing wells are sufficient.

22 MR. AMPOMAH: Then let me flip the
23 question. Were you inferring that we should drill
24 three stratigraphic wells at least to be sufficient to
25 characterize a storage complex?

1 THE WITNESS: I think that's right.

2 And if you want to use existing wells, you have the
3 problem of making them resistive to -- to CO2.

4 MR. AMPOMAH: Okay. I get your point
5 now. Okay.

6 THE HEARING OFFICER: All right. Let's
7 take an afternoon break and return at 2:15.

8 (Off the record.)

9 THE HEARING OFFICER: Mr. Ampomah, do
10 you have additional questions?

11 MR. AMPOMAH: Yes, I do.

12 And, Professor Harvey, thanks so much
13 and welcome back. So we are on page CG-035.

14 THE WITNESS: Yeah.

15 MR. AMPOMAH: Yeah. And so I just want
16 to know a little bit more about the simple scaler
17 factor. Now, so I'm looking at the top, number 3.
18 Now, my question to you is, who determines this? And
19 from your experience, how is OCD going to verify the
20 scaler factor?

21 THE WITNESS: Well, the scaler factor
22 shouldn't be one. So, you know, it's -- it's a way of
23 specifying a margin for safety, which I think clearly
24 has to be done. I'm not sure I'm in the position to
25 tell the regulators exactly how to do that. And I

1 don't believe, in here, we specify a particular
2 number. Let me just say, it needs to be a good deal
3 greater than one.

4 MR. AMPOMAH: Yeah. But so I
5 thought -- you've done the research you are proposing.
6 You know, you are proposing that the commission adapt
7 that. And as a commissioner, before I can concur with
8 you, I need to know the uncertainties that would be
9 associated with that number. So it sounds to me that
10 probably it's more appropriate to get into a guidance
11 than a rule.

12 THE WITNESS: Yeah. Well, you know, I
13 would like to see a floor on it. And you said
14 uncertainties of that number. I mean, the number is,
15 in part, meant to capture the uncertainties in the
16 AOR. So 1 would be a bad number, implying that there
17 are no uncertainties. It's a hard question, and I'm
18 not going to tell you it needs to be 2 or 2.5 for
19 that.

20 MR. AMPOMAH: Yeah. So without a
21 certainty on that factor, then don't you believe it
22 can more or less go into a guidance, you know, than
23 more of a rule?

24 THE WITNESS: I -- yeah. I mean, you
25 could get very complex about this. You could try and

1 assess the uncertainty in the AOR modeling from each
2 site and base it as a -- you know, a factor on the
3 variance of the plume perimeter, that kind of thing.

4 MR. AMPOMAH: Sheila, if I may worry
5 you a little bit, can you pull up my recommended
6 suggested changes so that Professor Harvey can review
7 that?

8 THE WITNESS: Oh, okay.

9 MR. AMPOMAH: And see if he concurs
10 with that, or at least if that will address some of
11 the concerns that he has.

12 Now, whilst we are waiting for that, I
13 do have two more questions on this same page for you.
14 So in your C -- so that will still be on CG-035. C,
15 I'm looking at it from the top. You are suggesting
16 some databases that operators would have to search; is
17 that correct? The new C?

18 THE WITNESS: Yeah.

19 MR. AMPOMAH: Okay.

20 THE WITNESS: Yeah.

21 MR. AMPOMAH: So my question to you is,
22 do you have a fair idea as to the current databases
23 that they are normally used in New Mexico, at least
24 when an operator is applying for a permit?

25 THE WITNESS: I -- I don't think I know

1 any more about what's in New Mexico than -- than the
2 regulators. Probably, no.

3 MR. AMPOMAH: So what that probably
4 means is that what you are providing to the commission
5 for us to adapt is not probably exhaustive enough.
6 Would you agree with that?

7 THE WITNESS: Yes. I -- I think you
8 should use all possible databases for abandoned wells.

9 MR. AMPOMAH: And OCD do know the
10 databases that are available and acceptable. So don't
11 you believe that we should leave it as a discretion of
12 the director?

13 THE WITNESS: Maybe specify all
14 appropriate -- all databases of abandoned wells.

15 MR. AMPOMAH: Thank you. And the last
16 one will be -- so I'm looking at the number 5, the
17 reevaluation. So you are putting some metrics here.
18 And I just want to ask you, are you familiar with the
19 seismicity protocols that has been established for the
20 state of New Mexico?

21 THE WITNESS: No, I don't know what the
22 quantities are.

23 MR. AMPOMAH: Without knowing that --
24 and you did not crosscheck that, so would you believe
25 that it could be in conflict with what you are

1 proposing?

2 THE WITNESS: That -- without knowing
3 that, I could be in conflict? Yeah, I'm not sure I
4 can answer that.

5 MR. AMPOMAH: Okay. I appreciate that.

6 THE WITNESS: Yeah.

7 MR. AMPOMAH: So, Professor Harvey, I
8 want you to go through -- so on the screen, these
9 are -- you know, I've read through the rules and these
10 are some suggested changes that I would like to be
11 implemented in the rule, at least as a suggestion for
12 the applicant to more or less consider.

13 So I just want you to review number 3
14 and then number 4. So if you could scroll down.
15 Yeah. So number 3 and then number 4, specifically to
16 the AOR.

17 THE WITNESS: Okay. Do you want me to
18 read -- minute to read it?

19 MR. AMPOMAH: Sure.

20 THE WITNESS: Okay. I mean, 3 seems
21 reasonable. So 4 -- and I don't know if -- this feels
22 like I'm sort of throwing it back on you, but that is
23 a tough thing; right? And when I'm reading that, I
24 can imagine reading it from two different points of
25 view.

1 One is that, if I'm genuinely
2 interested in understanding all the uncertainty, the
3 sort of universe of possible plume pathways and -- and
4 pressure distributions, I agree with everything in
5 there.

6 If I put on a sort of different hat and
7 think that what I want to do is get a permit approved,
8 I also might like this, because there aren't actual
9 sort of specifications and floors on how much
10 variability or uncertainty you put into your
11 uncertainty calculations.

12 So maybe be a little more precise about
13 that. So it doesn't ask, for instance, to run your
14 model with possible configurations of fractures and
15 faults, or over what range of permeability or even
16 capillary parameters or something like that.

17 So I don't know how to -- regulations
18 work to make that tighter, but it alarms me in that
19 I -- I do know that if you want to achieve model
20 outputs in a statistical sense that are -- make a
21 pre -- you know, sort of predefined point, there are a
22 lot of ways to choose what you vary over what ranges
23 and what scenarios that you simulate. So I think
24 that's a frustrating answer, but it worries me.

25 MR. AMPOMAH: So if we go back to CG-

1 034, under 3-I, you are very clear, you know,
2 specifying the type of those entities that you really
3 want to be assessed. So either you're saying use an
4 example approach that considers the full range of
5 realistic variation in an interaction among key
6 parameters.

7 And you listed some of them, including
8 permeability field parameters, KVKH ratio, porosity,
9 relative pan caps, and hysteresis.

10 THE WITNESS: Yeah.

11 MR. AMPOMAH: Don't you believe that
12 that covers in my number 4 VII that I'm proposing?
13 And even VII?

14 THE WITNESS: Yeah. It's a -- it's a
15 step in the right direction, but I guess I didn't
16 understand -- this presupposes that's already in
17 there.

18 MR. AMPOMAH: Okay.

19 THE WITNESS: I -- I don't know. Yeah.
20 But, you know, if this were included along with number
21 4 here, that does push it in the right direction.

22 MR. AMPOMAH: Okay. So let's get back
23 to your testimony. So let's look at CG-042.

24 Thank you, Sheila.

25 So in there, I'm looking at number 4,

1 J-4. J-4. So you're saying that the owner-operator
2 must run a casing inspection log monthly to you by the
3 way?

4 THE WITNESS: I'm sorry.

5 MR. AMPOMAH: Go ahead.

6 THE WITNESS: CG -- my testimony? CG?

7 MR. AMPOMAH: 042? Page -- yeah, CG-
8 042. And I'm looking at J.

9 THE WITNESS: Okay. My testimony
10 starts on CG-090.

11 MR. AMPOMAH: No, I'm looking at the
12 actual rule itself.

13 THE WITNESS: Oh, okay. Of course.

14 MR. AMPOMAH: Wasn't clear about that.

15 THE WITNESS: Yeah.

16 MR. AMPOMAH: Okay. Now, so is it your
17 testimony that you require the casing the MIT -- yeah,
18 the integrity test to be done on a monthly basis?

19 THE WITNESS: Yeah, that's -- that's
20 correct.

21 MR. AMPOMAH: That's a little
22 interesting, though, because my question to you is,
23 have you evaluated your personal risk associated with
24 repeatedly pulling tubing to conduct these monthly
25 casing inspections?

1 THE WITNESS: Right. That's a good
2 question. And -- and I -- I suspect you may know more
3 about that than me.

4 MR. AMPOMAH: So even though it is
5 making the rules stricter, but the question is, your
6 personal logistics, can we really make this work?

7 THE WITNESS: Yeah. Well, and -- and
8 are you in danger of damaging the well by -- by doing
9 this too often, I think.

10 MR. AMPOMAH: Exactly.

11 THE WITNESS: Yeah. I don't know the
12 answer to that. You know, I don't -- I don't have
13 familiarity with, you know, what the odds are of
14 damage and, you know, whether it accumulates or --
15 I -- I don't -- I don't know if that's -- that's
16 something that petroleum engineers presumably have
17 studied. I don't know.

18 MR. AMPOMAH: So then are you more or
19 less now flexible about the monthly to more or less
20 still keep the language that was already there?

21 THE WITNESS: Yeah, I'm flexible. If
22 there's a sound argument that it's damaging, you can
23 do it too often and there's no way to avoid that.

24 MR. AMPOMAH: Okay. I appreciate that.
25 So let's get to CG-043. So that would be the next

1 page. And I'm not going to ask you about the testing
2 because, I mean, it has been discussed extensively,
3 but I want to go to 4-B. I want to go to 4-B. CG-
4 043.

5 THE WITNESS: Yeah.

6 MR. AMPOMAH: Yeah. So you are -- you
7 want a minimum of four monitoring wells. A minimum --
8 yeah. No fewer than four monitoring wells. And
9 without the knowledge about the geology in New Mexico,
10 you know, mostly San Juan, and Permian, my question
11 will be, how did you determine this?

12 THE WITNESS: So can I ask this? Are
13 you -- are you concerned that the geology in New
14 Mexico is so homogeneous that you don't need very many
15 wells?

16 MR. AMPOMAH: Okay. So we can -- I'm
17 not saying you don't need many wells, but I believe
18 that it has to be site-specific and not necessarily --

19 THE WITNESS: Right.

20 MR. AMPOMAH: -- we saying it has to be
21 at least four wells. Because, you know, I don't --
22 because of time, I do not want to really go much into
23 detail with regards to, let's say -- now, if you look
24 at the -- if you take the San Juan Basin as an
25 example, there is a preferential flow direction.

1 THE WITNESS: Yeah.

2 MR. AMPOMAH: There is a preferential
3 flow direction. And I believe that, before you can
4 set a monitor well, you want to know that direction.
5 And through that, then it can also give you a fair
6 idea as to whether to place a monitoring well. Would
7 you agree with me on that?

8 THE WITNESS: Well, maybe get a little
9 long-winded about it. How do you know that flow
10 direction?

11 MR. AMPOMAH: Because I've done the
12 research. I've done the research. I've done -- so
13 that's why I do not --

14 THE WITNESS: -- from existing wells,
15 but you -- you know -- you know it. So you don't need
16 to put in wells to -- to determine that. If that's
17 the case, I'm not sure that actually helps you.

18 So if these are wells in the drinking
19 water aquifer, what you're looking for is changes in
20 water chemistry there; right? That is not going to --
21 those changes, if there is a leak, aren't going to be
22 homogeneous. They're going to be caused by, you know,
23 a leak of CO2 or a brine -- or brine with CO2 into the
24 drinking water aquifer. Then you have -- you know,
25 what are the odds of finding that? The more wells,

1 the better.

2 From your question, I suppose you could
3 make an argument that you put your wells more
4 downstream than upstream. You know, I could see that
5 kind of thinking. But having worked on a lot of
6 groundwater contamination set -- sites for wells, it's
7 absurdly small; right? No one goes and characterizes
8 groundwater contamination with only four points.

9 So I -- I still think it's a floor, but
10 I'm open to the floor needs -- it's the first floor
11 and we need the third floor about this or something.

12 MR. AMPOMAH: And I think these
13 monitoring wells needs to penetrate the indexing
14 zones.

15 THE WITNESS: Yeah. So the example I
16 just gave is that they're in the -- the drinking water
17 aquifer. And I think we talked before about three
18 wells penetrating the injection zone. I'm open to --
19 you know, I don't -- I don't know whether there's some
20 combination where you -- you know, you do both with
21 the same well. I kind of doubt it, but maybe there
22 is.

23 Yeah, I don't know. I don't know if
24 that's answering your question, but I do think because
25 you're looking for plumes -- well, I -- I don't want

1 to set the floor any lower on -- on anything.

2 MR. AMPOMAH: Yeah. And once the plume
3 gets to these monitoring wells, one nest. You know,
4 I'm looking at it from the risk point of view.

5 THE WITNESS: Yeah.

6 MR. AMPOMAH: Having many penetrations
7 into your injection zone, where these wells are
8 just -- only for monitoring purposes. That poses a
9 risk. That is where I'm coming from.

10 THE WITNESS: Yeah. Yeah. So I'm --
11 I'm optimistic if they're constructed with the right
12 material. The risk may not be that -- well,
13 obviously, if they're poorly-constructed, there's
14 terrible risk. But it's a balance. You know, if you
15 put in a hundred of them and one of them goes bad,
16 that's not good.

17 But here's a simple -- a simple
18 argument that you need three. It takes three points
19 to define a plane. So if you want to -- if you want
20 to, you know, define the -- the pressure field, the
21 direction of flow in the injection zone, you'd need
22 three. I mean, reality's much more complicated than
23 that, obviously.

24 MR. AMPOMAH: Yeah. So don't you
25 believe that we have to leave it at the discretion for

1 the director or OCD to make this determination in
2 discussion with the operator, considering the risk,
3 you know, the geology, other than more or less putting
4 a strict number 4 into the rule?

5 THE WITNESS: Right. I mean, this is
6 sort of saying the same thing again. It's that, I
7 don't know if we agree that there needs to be a floor,
8 but I worry that if you don't have a floor, something
9 will happen in the future where someone gets away with
10 one well, or even argues for no wells into the
11 injections there.

12 MR. AMPOMAH: But that would be on the
13 operator to justify how they believe that, let's say,
14 four wells, or more wells, or less than four wells
15 will still be able to protect the USDW.

16 THE WITNESS: Right. So you want to
17 open it up, but I don't know -- but, you know, you
18 could open this up so that the operator could make
19 the -- operator could make an argument for zero wells?

20 MR. AMPOMAH: For any number of wells,
21 that has to be negotiated with the director. And the
22 director's objective is to protect the underground
23 source of drinking water.

24 THE WITNESS: Right. I just want to
25 close off the possibility of zero, one, or two wells.

1 MR. AMPOMAH: Okay. The director has
2 the capabilities. You know, let's wrap up. Let's go
3 to page CT-044. So that would be -- yeah, the next
4 page. Now, so that would be 9 -- no, that would be
5 10-B.

6 You're proposing a new language here.
7 And you're saying that the owner or operator shall
8 purchase a state owned. So I'm just asking, does the
9 state manufacture these stations? What is a -- like,
10 can you explain a little bit what you mean by that?

11 THE WITNESS: I don't think they're
12 buying it from the state. They're purchasing it for
13 the state.

14 MR. AMPOMAH: So you're saying you
15 purchase it for the state or have the state -- yeah.
16 Can you clarify that paragraph B?

17 THE WITNESS: So the owner or operator
18 will purchase distributed acoustic network seismic
19 sensors. And, you know, the -- the state will own the
20 data.

21 MR. AMPOMAH: And so are you aware that
22 there are stations already in New Mexico that the
23 state controls?

24 THE WITNESS: Yeah. I'm aware there's
25 some. I don't know the details of it all. And the

1 idea here is to increase the resolution at the -- at
2 the site.

3 MR. AMPOMAH: So definitely you'll
4 start with what is available and then you fill in the
5 gaps?

6 THE WITNESS: Yeah. Right. And if
7 you get lucky and there's a huge number already at
8 your site, then good for you.

9 MR. AMPOMAH: Professor Harvey, thanks
10 so much for your time. I do not have any further
11 questions for you. Thank you.

12 THE WITNESS: Thank you. My pleasure.

13 THE HEARING OFFICER: Thank you,
14 Commissioner Ampomah.

15 Commissioner Czoski, do you have
16 questions for Dr. Harvey?

17 MS. CZOSKI: Yes, I do.

18 Hello, Dr. Harvey. Thanks for your
19 time today.

20 THE WITNESS: Hi.

21 MS. CZOSKI: So there's been some talk
22 about information in the public record and what should
23 be shared. And as you've been reviewing these
24 applications that you've said they were -- a lot of
25 them you've reviewed have been redacted; correct?

1 THE WITNESS: That's true.

2 MS. CZOSKI: Have you noticed if a lot
3 of these applications have some basic information
4 missing, like the well location and maybe the
5 injection zone, just kind of basics?

6 THE WITNESS: Yeah. I mean, I don't
7 want to overstate that I've done some of the
8 statistical analysis of, you know, all the
9 applications out there. But in my experience, yes.
10 I've seen one from Illinois that had that redacted.

11 MS. CZOSKI: Okay. Thank you. Yeah.
12 I've looked at a few and it seems like some of them
13 have more information than others.

14 THE WITNESS: Right. And that one's a
15 real head-scratcher. You know, how can you redact the
16 location of the site? Yeah.

17 MS. CZOSKI: Yeah. So for wells -- for
18 other wells besides Class VI wells in New Mexico, like
19 oil and gas or injection wells, during the application
20 or the permitting process, the information is shared
21 to the public of the well type, the location, the
22 formation of injection or production, well
23 construction details, et cetera.

24 Do you think this should be available
25 to the general public as part of the application

1 period and public comment period?

2 THE WITNESS: Yeah, I do. Because
3 without that, they don't have the -- they don't have
4 the possibility of really assessing it. With it, it's
5 still pretty difficult, but without it, it's not even
6 possible.

7 MS. CZOSKI: Do you think it would be
8 good to have clarity in the rule that that basic
9 information should be available to the general public?

10 THE WITNESS: Yes, I do.

11 MS. CZOSKI: Thank you. And for people
12 in the area of review -- so they might have the most
13 immediate impacts from this project -- do you think
14 there should be more information available to them to
15 help them decide if they want to put in a protest or
16 an appeal for a Class VI project?

17 THE WITNESS: Yeah. And I'm going
18 to - if I may, let me sort of put it from my
19 perspective. If I were to learn that a giant bubble
20 of buoyant gas -- which is toxic, if it comes to the
21 surface -- were injected under my house, I -- I would
22 want to know all about it. And so, you know, if I
23 apply that -- that thinking to the general public,
24 which you should, yeah, it should all be available.

25 MS. CZOSKI: What other information do

1 you think would be useful to provide to people in the
2 area of review? Both, like, mineral and surface
3 owners?

4 THE WITNESS: Information. So yeah,
5 I'm not quite sure how to answer that, but I would
6 think -- I would hope that all of the information
7 required for the -- for the permit application were
8 sufficient. I could -- I -- I don't know. I could
9 speculate. Maybe someone wants more specific
10 information about exactly their property, but I -- I
11 don't know. I -- I don't really know.

12 MS. CZOSKI: Do you think the area
13 of -- like, a map of the area of review should be
14 available to the general public?

15 THE WITNESS: Oh, yeah. For sure.

16 MS. CZOSKI: Thank you. Do you think
17 that should also be in the rule to clarify that that
18 should be available to the public?

19 THE WITNESS: Yes. Yes, certainly.

20 MS. CZOSKI: Thank you. Let's see
21 here. I'm just looking through my notes. So in your
22 research, do you have any estimation of how long it
23 might take for a plume to be stabilized?

24 THE WITNESS: Well, it would be useful
25 if we had ever -- if we had any field data showing

1 that a plume ever has been stabilized. And I'm
2 unaware of that. And I'm -- the sort of theoretical
3 modeling of it, we're talking modeling, I think is
4 very uncertain. I can go into more detail as to why I
5 think it's uncertain. But actually, I forget exactly
6 what your question was.

7 MS. CZOSKI: Just like -- just an
8 estimate, if you know, kind of how long it might take
9 for a plume to stabilize. And I'm sure there's a lot
10 of different aspects that go into that estimation, but
11 just --

12 THE WITNESS: There's no estimate --
13 yeah. There's no estimate that I'm aware of based on
14 empirical data. I have no doubt that someone's run a
15 model somewhere and -- and shown the plume stabilized,
16 but it probably happens mostly where the plume is
17 actually -- has lateral structural confinement. You
18 know, like a plume is -- is trapped in an anticline
19 and then becomes stable.

20 MS. CZOSKI: Okay. Thank you.

21 THE WITNESS: But that -- that's
22 theoretical. I mean, that -- that -- we -- we don't
23 have data on that.

24 MS. CZOSKI: Do you think -- if this
25 was modeled, do you think that financial assurance

1 should be in place until the plume has been
2 stabilized?

3 THE WITNESS: Okay. I think financial
4 assurance means assurance that the operator will pay
5 damages. Is that what I understand, or?

6 MS. CZOSKI: Yes.

7 THE WITNESS: That the operator has the
8 finances to maintain their monitoring. So I think
9 both of those things should be true.

10 MS. CZOSKI: Okay. Thank you. Let's
11 see if I can go -- I was using your presentation kind
12 of for guiding my questions, but let me go to your
13 testimony so it's easier to point you in the right
14 direction. One second. Oh, I'll go back to that one.
15 Sorry for the delay. Switching back and forth between
16 things. One second. So let's see. On page CG-127?

17 THE WITNESS: Yeah.

18 MS. CZOSKI: In this -- let's see --
19 Number 2II, you talk about the suspected -- well, this
20 is in the rule, but the suspected faults and fractures
21 that may transect the confining zone in an area of
22 review. Do you think that all faults within the area
23 of review should be included in this, not just ones
24 that could transect the confining zone?

25 THE WITNESS: Yes. If a fault's

1 activated, it causes a lot of geomechanical effects,
2 or it can.

3 MS. CZOSKI: Thank you.

4 THE WITNESS: And also, the fault can
5 control the migration of the CO2 plume. And if that's
6 not in your model, your model will be wrong.

7 MS. CZOSKI: Okay. So on page CG-130,
8 can you explain just the change you're suggesting in
9 II with a little more detail? I believe this section
10 is about when you need to complete an area of review
11 and corrective action plan.

12 THE WITNESS: Yeah. It's -- it's sort
13 of adding these thresholds explicitly. And, you know,
14 sort of trigger an automatic reevaluation of the area
15 of review.

16 MS. CZOSKI: So I guess this is kind of
17 related, but let's say a company wanted to drill
18 through -- let's say, the area of review where the
19 plume is going to be or might be to get to a deeper
20 oil and gas zone. Do you think that would be a case
21 where an AOR should be reviewed and updated again?

22 THE WITNESS: Yeah. That's an
23 interesting one. Yes, probably for a couple reasons.
24 One is, presumably it's going to start pumping from
25 below. I'm not quite sure what that will do

1 geomechanically. This is a complicated one; right?
2 You have injection above and presumably some lower
3 confining weather because they're after hydrocarbons
4 below it.

5 And that -- I don't really want to
6 state, you know, what exactly the change to the stress
7 state would be. But I think you certainly need to
8 consider that carefully.

9 MS. CZOSKI: And kind of along the same
10 lines, I know in your testimony, you talked about that
11 monitoring wells should also be constructed using the
12 same materials as a Class VI well; is that correct?

13 THE WITNESS: Yes.

14 MS. CZOSKI: Do you think, if there's
15 going to be a new well drilled through the injection
16 zone, maybe, you know, looking for deeper oil and gas
17 reservoir, do you think that should be constructed to
18 the same standards?

19 THE WITNESS: Yeah. Yeah. If you use
20 conventional material, that well in the injection zone
21 could be degraded and fail. And also, because it's
22 passing through the -- the injection zone everywhere
23 all the way to the surface, it's also susceptible to
24 degradation and failure.

25 I think -- I think this is a point we

1 made earlier that you want to do the whole thing that
2 way because it is plausible in a number of ways,
3 seismic activity, other things that -- you know, a gap
4 or something, you know, outside the well, or something
5 goes wrong with the well and a buoyant CO2 plume
6 starts to move upward along the well.

7 And then if it -- if it dissolves
8 the -- the cement in the well or the steel, then that
9 just provides a -- a quick path to the surface, or
10 into the drinking water aquifer.

11 MS. CZOSKI: Okay. Thanks. I know you
12 added a definition for intensive corrective action
13 area; correct?

14 THE WITNESS: Yes.

15 MS. CZOSKI: And I don't really know if
16 this would be in New Mexico specifically, but in this,
17 you only talk about brine inject -- like, injecting
18 into brine. And I'm wondering how you think this
19 might change if there was injection into, like,
20 basalts for sequestration?

21 THE WITNESS: Oh, wow. That's
22 interesting. Into basalt? Okay. Yeah. I don't
23 know. I'd have to think about that. I mean, you
24 know, basalt has different kinds -- yeah. I could
25 only speculate. I'm not sure how useful you know,

1 different kinds of fracture patterns than -- than
2 sedimentary rock.

3 Geochemically? Well, I don't know what
4 we're comparing to, but, you know, basalt certainly,
5 you know, unlikely to have significant solid carbonate
6 in it.

7 MS. CZOSKI: Yeah.

8 THE WITNESS: I don't know. I mean, I
9 think -- I think you -- you could think about that
10 more carefully. But I -- are there basalts in there?
11 Or maybe I can look that up.

12 MS. CZOSKI: There are, but I don't --
13 yeah. Like I said, I don't know if it would be
14 feasible to inject into, but.

15 THE WITNESS: Yes, there are.

16 MS. CZOSKI: I know there's been some
17 discussion about looking at operation or historical
18 injection projects within a 10-mile radius. And I
19 guess -- sorry if this is a repeat, but can you remind
20 me of how you arrived at a 10-mile radius to look at
21 those?

22 THE WITNESS: Well, it's -- it's
23 explicitly different than -- you know, it -- it's set
24 as a quantity as opposed to the -- the radius of the
25 AOR. And that's -- that's intentional because the

1 interactions could be very complicated.

2 If there was an injection well
3 somewhere, we don't really know where its injectate
4 has gone. It could have spread towards the -- towards
5 the CO2 injection well, for example. So it's just
6 meant to give a sort of reasonable -- you know, a
7 reasonable area where there could be some -- some bad
8 interactions.

9 MS. CZOSKI: And do you think that --
10 should this look at injection projects maybe -- or
11 just within the injection zone, or within different
12 injection zones as well that might be in the same
13 area?

14 THE WITNESS: Oh. Well, it -- I mean,
15 all of the Class -- we're talking about Class VI
16 injection zones?

17 MS. CZOSKI: Or, like, if there's a
18 salt water disposal well, you know, maybe it's in the
19 same area of review, but it's been injecting for 20
20 years before.

21 THE WITNESS: Oh, yes.

22 MS. CZOSKI: Before the Class VI well
23 or something similar?

24 THE WITNESS: Yes. Yeah. That's the
25 idea.

1 MS. CZOSKI: Okay.

2 THE WITNESS: You want to -- you want
3 to consider these other changes to the subsurface from
4 other injection wells.

5 MS. CZOSKI: Okay. Thank you. And
6 there's a lot of talk about older plugged wells,
7 ensuring that they're not going to be pathways for
8 carbon dioxide to leak. And I'm wondering if you, in
9 your experience or if you've read anything about
10 maybe, like, active -- let's say there's, like, an
11 active oil and gas well potentially being a pathway to
12 the surface, because it might not be constructed with,
13 you know, materials that are resistant to corrosion.

14 THE WITNESS: Yeah. It -- it wouldn't
15 be. I mean, if there's an active one within the area
16 of review, clearly you got to think about it. It also
17 changes the pressures and the flow pathways.

18 MS. CZOSKI: But how do you think -- I
19 mean, in the rule, they talk about corrective action
20 for plugged wells. Do you have any -- have you seen
21 anything similar with wells that are active?

22 THE WITNESS: Well, again, I -- you
23 know, I haven't read all the regulations. I don't
24 know if there's something that looks at that -- that
25 particular case.

1 MS. CZOSKI: Okay.

2 THE WITNESS: But it is alarming;
3 right? If you're pumping oil and gas out and nearby,
4 you're injecting CO2, I could easily imagine it's
5 going to pull the CO2 over to the well, and the well
6 hasn't been designed to withstand CO2. Sounds like a
7 bad idea.

8 MS. CZOSKI: Or even if it's an oil and
9 gas well that's not -- that's producing not from the
10 injection zone, but could the well still -- could be a
11 potential pathway if it's going through the injection
12 and confining zone. Do you believe it could still
13 potentially be a pathway for CO2 to leak?

14 THE WITNESS: Sure. Yeah. Because
15 it -- it's probably -- it has. If it's been -- if
16 it's pumping, it does reduce the pressures around it.
17 So it creates gradients that flow towards it. So
18 anything that gets through the -- the caprock would
19 likely be drawn towards that pumping well.

20 MS. CZOSKI: Okay. Thanks. And I have
21 a question about surface air monitoring. You said you
22 have experience with eddy covariance towers; correct?

23 THE WITNESS: Yes.

24 MS. CZOSKI: So if a company was going
25 to do air surface monitoring for a Class VI project,

1 what would that look like? Would that need to be,
2 like, an array of surface air monitors over an area,
3 or?

4 THE WITNESS: Yeah. So if you have
5 conventional, just CO2 detectors, you need a big array
6 of those. They're very expensive; right? That they
7 just measure locally concentrations. And they don't
8 necessarily even pick up a slow release of CO2. An
9 eddy covariance tower has a large footprint, depending
10 on how high the tower is.

11 So you could design this, depending on
12 what the size of your area review is, to not -- not
13 have very many, in some circumstances.

14 MS. CZOSKI: Okay. Thank you.

15 THE WITNESS: And the different methods
16 work differently in different topographies, things
17 like that. So I don't -- I don't think we specified
18 anything -- well, I know we didn't -- about, you know,
19 sort of the -- the design of surface monitoring.

20 MS. CZOSKI: So you believe that air
21 surface monitoring should be done, but the design can
22 be left up to the discretion of the director?

23 THE WITNESS: Yes. And, you know, I
24 sort of returned to my, like, if there was a giant
25 bubble of CO2 under my house, wouldn't we want

1 something that indicates -- you know, indicates
2 trouble?

3 MS. CZOSKI: So let's see. On your
4 testimony on CG-174.

5 THE WITNESS: Okay.

6 MS. CZOSKI: And I noticed in here, you
7 say that -- you mentioned including an unauthorized
8 zone, that the fluid has migrated to an unauthorized
9 zone. And I was just wondering why you thought that
10 was important to add in here.

11 THE WITNESS: Okay. We're looking at
12 the bottom of the page?

13 MS. CZOSKI: Oh, yes. Sorry.

14 THE WITNESS: Well, I -- I think it
15 just distinguishes the CO2 from a case where the CO2
16 is migrating into where you expect it to go in the
17 injected -- injection formation.

18 MS. CZOSKI: So there's a -- in the
19 rule in general, there's a lot of places where the
20 rule only really talks about endangerment to a USDW.
21 Do you think it would also be good to have text in
22 there saying, you know, won't cause endangerment to
23 USDW, or not allow fluid to migrate out of the
24 unauthorized injection zone?

25 THE WITNESS: Yeah. This gets into the

1 details of the language, and I'm -- I'm not even quite
2 sure the definitions to everything. The unauthorized
3 zone, presumably, is outside the AOR?

4 MS. CZOSKI: Or do you think the
5 unauthorized zone could possibly be, like, outside of
6 the authorized injection zone?

7 THE WITNESS: The authorized injection
8 zone, what is that? Is that --

9 MS. CZOSKI: Or the permitted injection
10 zone?

11 THE WITNESS: So the -- yeah. I'm not
12 quite sure if the permitted injection zone is -- is
13 what? The --

14 MS. CZOSKI: Where injection is allowed
15 to occur in the property?

16 THE WITNESS: Okay. Which could be
17 much larger than the -- than the AOR; is that right?

18 MS. CZOSKI: I'm thinking about your
19 opinion both maybe outside of the horizontal AOR, but
20 also vertical.

21 THE WITNESS: Right.

22 MS. CZOSKI: So I'd say, like, leaked
23 into a -- you know, maybe the CO2 leaked into an oil
24 and gas reservoir, geothermal reservoir above the
25 formation it's injecting into. Do you think

1 language --

2 THE WITNESS: Right.

3 MS. CZOSKI: Do you think that'd be
4 important to the plume?

5 THE WITNESS: Okay. I'm not quite sure
6 of the specifics, but it sounds like that is a case in
7 which the CO2 plume is behaving very differently than
8 what was predicted to construct the AOR. And so, yes,
9 you should reevaluate things when that happens.
10 And -- and I think -- or I'm sure you should -- you
11 should cease injection because you don't know what's
12 going on. Somehow, it -- it had moved through the
13 caprock.

14 MS. CZOSKI: Okay. Thank you.

15 THE WITNESS: I mean, I think -- I
16 think in any case where you find CO2 has moved through
17 the caprock, that's a serious problem, and -- and you
18 should stop injection.

19 MS. CZOSKI: Okay. Thanks. And on
20 page CG-34, down on the bottom in 3A2, where you
21 discuss the number of wells to characterize an
22 injection zone.

23 THE WITNESS: Yeah. But these are --
24 these are wells in the injection formation.

25 MS. CZOSKI: So I know there was some

1 talk about areas where there are a lot of wells
2 already from other activities, but I believe the USGS
3 has some areas maybe that don't have as much drilling
4 in them that could be potential. So do you think that
5 the three wells is a good baseline for maybe areas
6 that don't have as much information already?

7 THE WITNESS: Yeah. I think, you know,
8 it's the argument is that you don't want to have less
9 than that. I think a reasonable person could argue
10 that the floor should be higher than that. So it's a
11 modest floor.

12 MS. CZOSKI: And do you think this is
13 kind of a good example of where more clarity in the
14 rule could be helpful, rather than just having
15 something in guidance, or at the discretion of the
16 director to help guide, you know, operators who want
17 to drill, or want to permit a Class VI well?

18 THE WITNESS: Yeah. Yeah. I mean,
19 that -- that's the intent. And the operator -- you
20 know, wells are expensive and the operator's going to
21 avoid putting in wells, if they can.

22 MS. CZOSKI: Okay. Thank you. I
23 believe that's all my questions. Most of them got
24 answered before. So thank you, Dr. Harvey.

25 THE WITNESS: Thank you.

1 THE HEARING OFFICER: Thank you.
2 Chair Chang, any questions of
3 Dr. Harvey?
4 MR. CHANG: I do not at this time.
5 Thank you.
6 THE HEARING OFFICER: All right.
7 Ms. O'Grady, is there any reason not to
8 excuse Dr. Harvey?
9 MS. O'GRADY: No, there is no reason
10 not to excuse him. Thank you.
11 THE HEARING OFFICER: Thank you very
12 much for your testimony, Dr. Harvey.
13 THE WITNESS: Okay. Thank you very --
14 actually kind of enjoyed it.
15 THE HEARING OFFICER: All right. Let's
16 talk about where we go from here to our --
17 MR. CHANG: Take a brief recess for a
18 moment to take a restroom break and then -- yeah.
19 THE HEARING OFFICER: Absolutely.
20 MR. CHANG: Thank you.
21 THE HEARING OFFICER: Let's come back
22 at 3:20. Is that okay?
23 MR. CHANG: All right.
24 (Off the record.)
25 THE HEARING OFFICER: So we're back

1 after a break. And Ms. Gutierrez had expressed
2 interest in offering her opening statement.

3 Ms. Gutierrez, I think I see you on the
4 platform there. Please go ahead.

5 MS. GUTIERREZ: Thank you. Thank you
6 very much, Hearing Officer Orth.

7 Good afternoon, Chair Chang,
8 Commissioners. For the record, my name is Ana
9 Gutierrez with Womble Bond Dickinson, and I'm here on
10 behalf of the New Mexico Oil and Gas Association.

11 NMOGA does not have any technical
12 witnesses in this particular rulemaking, but as a
13 party, they didn't want to offer a statement for the
14 record. And mindful that we're winding up hearing and
15 I'm in the way of that, I will be very brief with my
16 remarks.

17 NMOGA represents more than 250 member
18 companies responsible for approximately 95 percent of
19 oil and gas activity in New Mexico. As reflected in
20 our filings, NMOGA generally supports OCD's proposed
21 rules, and that support is not just a formality. It's
22 really grounded in the extensive technical and
23 stakeholder process that produced this rulemaking
24 package that we've heard so much about.

25 And I just want to focus briefly on one

1 issue that remains particularly important to the NMOGA
2 membership, and that is the protection of the mineral
3 estate. The Stewardship Act itself recognizes that,
4 where the dominant mineral estate is utilizing the
5 surface for production, those formations "shall not be
6 interfered with." That issue directly relates to
7 several of the questions Commissioner Czoski has
8 raised, and NMOGA really appreciates the dialogue on
9 some of those issues.

10 As earlier testimony explained, a
11 conceptual version of this rule package included what
12 we've referred to as Reserve 4, which addressed
13 unitization, correlative rights, and ownership issues
14 related to both pour space and injected CO2. Those
15 provisions were ultimately removed and are not before
16 the commission today.

17 That said -- and this is the important
18 part -- NMOGA does not view their absence as an
19 insurmountable obstacle to the adoption of reasonable
20 Class VI rules. OCD has stated its intent to address
21 mineral interest issues in a future rulemaking, and
22 NMOGA welcomes that continued engagement. Adoption of
23 workable Class VI rules, it's a really important step,
24 but it's just the first step in a much longer process.

25 As OCD testified, after rule adoption,

1 OCD has to prepare and submit a primacy application to
2 EPA, and that just takes time. We've heard testimony
3 regarding Colorado's Class VI rules, and Colorado's
4 experience really illustrates my point here. That
5 rulemaking concluded in late 2024, yet EPA approval
6 remains pending today, although it is expected really
7 soon. That means we'll be about two years from state
8 rule adoption to final EPA primacy approval.

9 NMOGA simply asks this commission to
10 consider the fact that we still have time. We have
11 time to work through all of the issues and questions
12 that have been raised regarding unitization,
13 correlative rights, and ownership issues, and adopting
14 these technical Class VI rules in that process does
15 not foreclose those conversations.

16 Those conversations can, and they
17 should, proceed alongside the primacy process, nor
18 does the commission's actions predetermine the outcome
19 of that important work. NMOGA remains committed to
20 that discussion, and we look forward to continuing to
21 work with OCD and other stakeholders as those issues
22 move into a future rulemaking in the near term.

23 Thank you all for your time at this
24 hearing. I know it's been quite the process. We
25 appreciate -- very much appreciate your dedication.

1 Thank you.

2 THE HEARING OFFICER: Thank you,
3 Ms. Gutierrez.

4 My notes, Commissioner Czoski, show
5 that WildEarth Guardians made an opening statement
6 immediately following the Division's opening statement
7 last Monday. So I believe that is statements from
8 everybody. We have finished all technical witnesses.
9 We, tomorrow morning at 9 o'clock, will invite public
10 comment. And that, in fact, will be the final public
11 comment session for this hearing.

12 There will be no public comment
13 sessions on Wednesday, Thursday, or Friday. Public
14 comment session tomorrow will be supported by an
15 interpreter to interpret in real-time between Spanish
16 and English. So let's talk about the post-hearing
17 process next.

18 Mr. Tremaine, do you have an estimate
19 as to when would be a reasonable time to submit? And
20 I'm going to start with you because we need your final
21 proposal before then we set a subsequent deadline for
22 closing arguments for you to talk with the other
23 parties who have offered adjustments and to weigh
24 those adjustments and then decide what the Division's
25 final proposal will look like.

1 MR. TREMAINE: Thank you, Madam Hearing
2 Officer. Yes. So the -- although at this point on
3 day six, it may not seem like it, I actually think
4 that we have -- or may not feel like it in the moment,
5 I think we have clarity on the various positions and
6 recommended language, and we'll be able to work with
7 that relatively quickly.

8 There will be some areas we provided
9 testimony and rebuttal testimony on that may be
10 updated in the Division's final proposal. There are
11 many areas that, when you layer in stringency analysis
12 and you layer in statutory authority analysis, there
13 will be positions that we don't feel will benefit from
14 any elongated discussion or process. And we expect to
15 have clearly-outlined positions of the final red line.

16 So based on the understanding that we
17 typically get transcripts within about a week after
18 hearing, and that this one is kind of a mid-length
19 hearing, I think that we would be proposing final red
20 line and closing arguments in the first two weeks of
21 September.

22 THE HEARING OFFICER: All right.

23 So when is a good time for the other
24 parties to submit their closing argument and final
25 proposal? I just wanted to draw the Division out

1 first and give the other parties a subsequent
2 deadline. Would anyone else like to speak up here?

3 MS. RUSHING: Thank you for the
4 opportunity to weigh in. I think Conservation Groups
5 would like four weeks after the final proposal from
6 the Division.

7 THE HEARING OFFICER: All right.

8 MS. RUSHING: Or the transcript,
9 whichever one is later.

10 THE HEARING OFFICER: All right. So if
11 we assume that the Division would have its final
12 documents to Sheila and the rest of us by September
13 11th -- that's the second Friday there in September.
14 Four weeks later would be -- one, two, three, four --
15 hold on. One, two, three -- October 9th.

16 Mr. Pavlik, would you like to weigh in
17 here?

18 MR. TREMAINE: Madam Hearing Officer,
19 may I just clarify one question? I don't want to cut
20 off Mr. Pavlik, but in all prior rulemakings, the
21 parties have submitted concurrent closing arguments.
22 So what I just heard was a motion response reply type
23 schedule. And I don't think that that is actually
24 appropriate in this setting.

25 So if -- what we have seen before where

1 parties have different positions on final red lines,
2 so they're submitted along with the closings. So I
3 just want to clarify what -- you may not be there yet,
4 but.

5 THE HEARING OFFICER: Yeah. So I
6 wasn't really necessarily doing three steps there,
7 motion, response, reply. It was more that a new
8 baseline be submitted for the other parties to
9 consider to put in their own. So let's say you adopt
10 X number of adjustments offered by the Conservation
11 Groups.

12 They don't have to spend time on that
13 then; right? They know that when they submit their
14 own final proposal, the Division has already accepted
15 that. That's why I was going to give them a later
16 deadline.

17 MR. CHANG: For the commission, because
18 there were commissioners who also offered new language
19 here. So as far as I'm concerned, I'm not quite sure
20 what the proposal is in front of us because so much
21 has been muddled. Not necessarily in a bad way. But
22 there's some -- I think we need clarification on as to
23 exactly what's in front of us at some point, but.

24 THE HEARING OFFICER: And I have done
25 that in other cases. You may or may not been in the

1 surface water primacy hearing we did in June.
2 Unfortunately, because I would never try to torment
3 anyone, I got the same look from the lawyers
4 representing the Surface Water Bureau when I asked
5 them to go first.

6 MR. CHANG: Okay.

7 THE HEARING OFFICER: So that everyone
8 else had a new baseline to work from.

9 MR. TREMAINE: Would that entail
10 submission of OCD's final proposed red lines or red
11 lines and its entire closing argument?

12 THE HEARING OFFICER: I think the red
13 line is what's most important. If you'd like to do
14 your closing arguments when everyone else is doing
15 their closing arguments, that's fine. It's the red
16 line that I think people need to see before they're
17 expected to submit anything at all.

18 MR. TREMAINE: Thank you for the
19 clarification.

20 THE HEARING OFFICER: Okay. So are we
21 back to September 11th and October 9th?

22 Mr. Pavlik, do you have something to
23 say?

24 MR. PAVLIK: Those dates sound good to
25 us, as does the idea of having an updated red line to

1 work with, and knowing what we'd be responding to.
2 Really appreciate that. I think that would be very
3 helpful. Thank you.

4 THE HEARING OFFICER: All right.

5 Ms. Gutierrez?

6 MS. GUTIERREZ: Same for us. Those
7 deadlines work. Thank you.

8 THE HEARING OFFICER: Thank you.

9 And, Mr. Tucker?

10 MR. TUCKER: Yeah. I was just going to
11 chime in to echo that those dates and format work for
12 Oxy.

13 THE HEARING OFFICER: Great.

14 MR. TUCKER: Thank you.

15 THE HEARING OFFICER: Yes. I learned
16 something new every month. Okay. So is there any --
17 so let me -- I'll put this on the transcript. I can
18 put it in an order if you need. The Division will
19 file and serve its final red line by September 11th.

20 And all parties' written closing
21 arguments, and whatever you would like to submit by
22 way of a proposed statement of reasons -- whatever
23 fraction of proposed statement of reasons you're
24 interested in submitting will be due from everyone on
25 October 9th.

1 Mr. Chair?

2 MR. CHANG: I understand that there
3 might be a motion from one of our commissioners.

4 THE HEARING OFFICER: Yes. It's great
5 to call -- just now.

6 Commissioner Czoski?

7 MS. CZOSKI: Yes. Thank you. So
8 earlier in the hearing, I attempted to offer a motion
9 that this process feels kind of rushed, and there are
10 parts of the rule that feel incomplete. It is
11 imperative that we do a rulemaking properly, including
12 all needed parts of a rule.

13 So again, I suggest we pause this
14 proceeding for 60 days, and to see if we can do this
15 rulemaking completely and address other concerning
16 issues that were raised today, and other times during
17 this hearing. Therefore, I move to table this hearing
18 for 60 days and re-adjourn at a later time to see
19 where we stand.

20 MR. CHANG: Okay. Is there a second,
21 at least for discussion purposes?

22 MR. AMPOMAH: Always.

23 MR. CHANG: Okay. So motion is to
24 suspend or table -- I guess, or suspend for 60 days.
25 Did I get that correctly?

1 MS. CZOSKI: Yes.

2 MR. CHANG: Okay. You're welcome to
3 provide any further thoughts, or just -- or arguments,
4 or recommendations as to why.

5 MS. CZOSKI: With a lot of the issues
6 that were raised, including CO2 ownership after it's
7 been injected, unitization, and mineral issues, it
8 just seems like we might need more time to review
9 those before reconvening for final arguments.

10 MR. CHANG: Okay. 60 days out from
11 today would get us into -- let's see, September,
12 October. So early October, October 3rd or 4th,
13 something along those lines; right? Or 2nd, maybe. I
14 think we just heard from the parties that they were
15 anticipating taking a few months to, A, produce a
16 compendium of all the issues that were discussed here
17 in this hearing. And then other parties were going to
18 debate.

19 And I think the deadline that we were
20 talking about in terms of coming back to the
21 commission would be October 9th. So that seems to
22 track pretty closely to the 60 days that your motion
23 seems to be recommending, or are you suggesting that
24 we --

25 MS. CZOSKI: In a --

1 MR. CHANG: Just let me finish the
2 thought. I just want to clarify what you're -- what
3 the motion is asking for, or is the thought to further
4 push those deadlines that we just talked about by
5 another 90 days or does -- or I'm sorry, 60 days? Or
6 do the deadlines that the parties were just
7 contemplating with our hearing officer sort of maybe
8 capture the same 60-day time frame that you're
9 contemplating?

10 MS. CZOSKI: I'm concerned the time
11 frame that we've discussed is not enough time to
12 properly address these issues, that we might need more
13 time.

14 MR. CHANG: Okay.

15 Commissioner Ampomah, any thoughts?

16 MR. AMPOMAH: Yeah, I do have
17 questions.

18 So, Commissioner, I do have some
19 questions for you. Now, so the big problem that you
20 have is regards to the pour space; is that correct?

21 MS. CZOSKI: The CO2 ownership, I feel
22 like, is a big concern, especially when we talk about
23 financial assurances and liabilities with that, as
24 well as protecting mineral estate.

25 MR. AMPOMAH: So that is all still

1 under the pour space?

2 MS. CZOSKI: Well, I think it's hard
3 because questions need to be answered more.

4 MR. AMPOMAH: But I'm just saying that
5 all these questions -- assuming there is a rulemaking
6 for pour space, will all of these questions not be
7 answered at that time, if there is an actual
8 rulemaking for -- more centered on minimal estate and
9 let's say pour space?

10 MS. CZOSKI: Sorry, so what was your
11 question?

12 MR. AMPOMAH: My question is, you
13 raised three issues, CO2 ownership, mineral issues,
14 and then pour space.

15 MS. CZOSKI: Oh, unitization.

16 MR. AMPOMAH: Unitization. Yes. Yeah.
17 So once you have unitization, it can more or less
18 cover all these other issues that you -- the concerns
19 that you have; is that not correct?

20 MS. CZOSKI: Once unitization is
21 covered?

22 MR. AMPOMAH: Mm-hmm.

23 MS. CZOSKI: I think they're more
24 separate than -- I don't think unitization would talk
25 about CO2 ownership, for example.

1 MR. AMPOMAH: Okay. Let's get into
2 that discussion. So in the current Class VI --
3 Federal Class VI, do you know who owns the CO2?

4 MS. CZOSKI: It's not in the rule.

5 MR. AMPOMAH: But so who submits the
6 financial assurance?

7 MS. CZOSKI: The operator.

8 MR. AMPOMAH: And what are the
9 conditions associated with that financial assurance?
10 Are you familiar with all of that?

11 MS. CZOSKI: Yes. I mean, I've read
12 the rule, but I think the other question is that the
13 state land office, at least, and maybe the BLM's
14 leases, allow for CO2 injection -- or CO2 production.
15 So that's kind of why we need to clear up who owns the
16 CO2.

17 MR. AMPOMAH: You know, so how does
18 that fall under the Class VI?

19 MS. CZOSKI: How does it fall under the
20 Class VI?

21 MR. AMPOMAH: Yes.

22 MS. CZOSKI: Because the CO2 is going
23 to be injected, and we need to understand who owns it,
24 and who's liable for it, and what happens to it when
25 it's been injected.

1 MR. AMPOMAH: When you say liable for
2 it, I mean -- so I want you to connect that to the
3 financial assurance. You know, because let's say
4 before the state will give a company -- or let's say
5 even the federal government will give a company the
6 permit to go and inject that CO2. You own that CO2.
7 You have to take care of that CO2. That is why you
8 have corrective actions. You have all these plans,
9 emergency response plans.

10 So I'm a little bit so -- I do not
11 necessarily understand when you say who owns that CO2,
12 especially when someone is insuring that CO2.

13 MS. CZOSKI: I just think it needs to
14 be more clearly stated in the rule instead of kind of
15 implied.

16 MR. AMPOMAH: Now, let me ask. So
17 assuming -- you said that even the 60 days is not
18 going to more or less be enough. But even within that
19 60 days, I'm not -- as I sit here, I do not think that
20 OCD can go back and give us a new rule that we've not
21 even listened to any testimony about.

22 So what you are proposing here, from my
23 point of view, has to be in another rulemaking, where
24 there has to be actual rules set and brought before
25 the commission. So I'm still struggling how the

1 concerns that you've raised could be added to the
2 current rulemaking that we are almost done with the
3 evidentiary hearing. So how do you see the path
4 forward?

5 MS. CZOSKI: I mean, I'm not an
6 attorney, so I'm not super familiar with the way rules
7 are presented and written. This is my first time on
8 the commission. But yeah, I don't --

9 MR. AMPOMAH: Yeah. So if you are not
10 too familiar with that, then at least what I know is
11 that there has to be two separate rulemakings.
12 Because let's say pour space issues. Without pour
13 space issues settled, can New Mexico go ahead and get
14 primacy? The answer is, yes. EPA is already
15 permitting the well right now in New Mexico; right?

16 I do feel like the pour space issue is
17 on the operator, not on OCD. If you do not have pour
18 space, why are you going to put your CO2? You have to
19 find out that. I mean, at least someone can come in
20 to OCD and say that, "Okay, all my CO2 plume,
21 everything is all on federal land, the other land, or
22 on a private land." And I don't think anything
23 prevents them from proceeding with the permitting. So
24 I do see two different paths here.

25 What you are proposing, if we are to

1 accept that, then it means we are muting everything
2 that we've done for the past week and then additional
3 day, and we are going to essentially start from
4 scratch. That is my understanding.

5 MR. CHANG: Yeah. To add to that, I
6 mean, generally speaking, there's notice requirements
7 to let people know -- the public know; right? An
8 interested party know whether to enter or not. So the
9 scope of the rulemaking that's being contemplated,
10 there's usually, typically some notice.

11 But let me back up a little bit because
12 I think I asked a similar question when we had this
13 same conversation earlier, which is what is -- or what
14 is your hope for the 60 days? And I think helping me
15 understand that might help me better articulate
16 whether -- and figure out whether or not there's a way
17 for us to accommodate what we're trying to accomplish
18 here.

19 Because if it's merely a matter of
20 timeline that it's better to deliberate in -- I don't
21 know, November instead of September; right? Or if
22 it's merely a calendar issue, where -- commissioner
23 unavailability to deliberate because somebody's
24 traveling or hasn't known, then certainly the dates
25 alone will solve the problem; right?

1 What I'm trying to figure out is, it
2 seems as if, Commissioner, that you're raising some
3 concerns that I'm not necessarily sure that, even if
4 we were to extend the time of -- and the timeline for
5 this particular rulemaking for 60 days, I'm not sure
6 that that, in and of itself, is going to move the
7 needle in terms of being able to resolve unitization,
8 or some of the others, like CO2 ownership, for
9 example.

10 So I'm trying to figure out whether
11 there's maybe even a more effective way or a better
12 way for us to -- or if there is a way for us to
13 accommodate some of the issues that you're raising.

14 Because I'm just not sure that in 60
15 days -- because even if we were to table it for 60
16 days, unless we were to specifically instruct the
17 parties to do something in those 60 days, I feel like
18 we'd end up exactly in the same position without
19 having necessarily resolved or moved the needle
20 forward on the new -- on some of the issues that you
21 have raised merely by granting a 60-day extension.

22 So those are -- that's where I'm trying
23 to -- struggling a little bit to connect and square
24 the circle there, because I'm not -- I don't have any
25 ideological lock on September 11th or October 9th.

1 And certainly, if -- if there was some
2 sort of magic to the 60 days, I'm certainly happy to
3 talk to -- open the floor back up to the parties to
4 see if they would accept maybe a red line from OCD on
5 October 2nd for the other parties to respond by
6 October 30th, because that would -- you know, between
7 now and October 2nd, that's essentially 60 days.

8 So if it was merely a timeline issue,
9 I'd be happy to work with you on that. That's
10 certainly not a problem. I'm just not sure that, even
11 if we were to work in those 60 days, that
12 necessarily -- I'm not sure that that necessarily
13 solves the issues as I understand what you're trying
14 to solve. Does that sort of make sense as to what I'm
15 trying to get at?

16 MS. CZOSKI: Yeah, I think so. I think
17 within 60 days, it would be nice to see if these
18 issues could be addressed and then the parties could
19 come back and talk before moving on to the final
20 closing arguments and see if it can be, you know,
21 integrated into this.

22 MR. AMPOMAH: So but my concern there
23 is that, that issues cannot be added to this
24 particular rule without starting from scratch.

25 MR. CHANG: I think Commissioner

1 Ampomah raises a point of certainly -- we can
2 certainly invite the parties to talk about issues and
3 to negotiate, as parties did in the vast rulemaking.

4 There were certain extensive post-
5 hearing rulemakings, but I think Commissioner Ampomah
6 has a point that, if the parties were to come back
7 with a proposal that is too -- you know, there's a
8 range of --

9 MR. AMPOMAH: Rule.

10 MR. CHANG: Yeah. There's a certain
11 amount of modification negotiations that is within the
12 sort of allowable realm. But if we -- but if what the
13 parties came back with was a substantially different
14 proposal, we would potentially run into notice and
15 procedural issues.

16 And I'm sure our Commission Counsel can
17 elaborate further on that, but that's why we're trying
18 to figure out whether or not a -- I'm just not sure
19 that a 60-day alone is going to be able to address
20 necessarily the concerns that you're raising, or to
21 even fully flesh them out. And as to -- and even if
22 the parties came to a different understanding, I'm
23 trying to figure out in my mind how that would all
24 work.

25 Now, that's not to say that I'm opposed

1 necessarily in opening up the floor back up to the
2 parties to say, you know, for example, like I said,
3 October 2nd and October 30th. So I'm not opposed to
4 60 days functionally, one way or the other, whether
5 through the mechanism of a stay or just through the
6 mechanism of giving parties extra time in post-
7 hearing, basically just doing a later schedule for
8 closings and post-hearing submissions.

9 I'm just not sure that time alone is
10 actually going to be able to expand the -- I think
11 that's what Dr. Ampomah is pointing out, too. Time
12 alone certainly could give parties more time to
13 interact and negotiate amongst themselves and with
14 other stakeholders not represented amongst the
15 parties.

16 But if we're -- but it may not be able
17 to resolve issues that are outside the scope of what
18 has been presented to the commission in this
19 particular rulemaking. That's not to say -- and I
20 think I'll echo some of the points made by NMOGA --
21 which is, that's not to say that those issues aren't
22 important, or that there won't be time to discuss
23 those issues. Whether or not they fit in this
24 particular -- the vehicle of this particular
25 rulemaking, I think that's the question. So that --

1 MS. CZOSKI: I think --

2 MR. CHANG: Go ahead.

3 MS. CZOSKI: I have another question.
4 So I know there's an option of briefing. Can you
5 explain that a little bit more? It would be possible
6 to ask for legal briefing on a lot of these issues?

7 MR. CHANG: Oh, I think the parties are
8 planning to brief some of these issues. Yeah. They
9 certainly can. And yes, we can certainly ask them to
10 brief whether or not these issues -- we can ask them
11 to brief whether or not those issues are within the
12 scope of the rulemaking, I suppose.

13 THE HEARING OFFICER: Mr. Chair,
14 Mr. Tremaine already agreed to address in a brief now
15 his closing argument and the points raised by
16 Ms. Marks's public company.

17 MR. CHANG: So yes, we can certainly
18 brief that. And that's what we're talking about,
19 though, is the time -- the deadlines for those briefs.
20 So I guess I'm asking whether or not if we
21 accommodated 60 days from today-ish. I think we're --
22 it might just be one day short, 59 days. But October
23 2nd happens to be a Friday. Would October 2nd for a
24 red line and October 30th --

25 THE HEARING OFFICER: I didn't want to

1 interrupt, Mr. Chair. I'm sorry. But no, I feel I
2 have to.

3 MR. CHANG: Please.

4 THE HEARING OFFICER: My little hearing
5 officer reports are modest. They may -- sometimes
6 they're helpful.

7 I had thought perhaps you would want to
8 deliberate in November and at least getting the red
9 lines and closing arguments from everybody by October
10 9th would allow me to prepare something, just a
11 roadmap for deliberations, compilation of proposed
12 amendments before you deliberated in November. So I
13 would hate to have October taken away entirely.
14 That's all.

15 MR. CHANG: Well, we're not --
16 deliberations aren't -- have we set a time for
17 deliberations? Yeah. So --

18 MR. AMPOMAH: Mr. Chairman?

19 MR. CHANG: Yes. Go ahead.

20 MR. AMPOMAH: You know, there is a
21 simple way to solve this whole issue.

22 MR. CHANG: Okay.

23 MR. AMPOMAH: Why not bring back
24 another rulemaking to really address all these issues?
25 I mean, I feel like that is the path forward trying to

1 bring this issue. You know, either way, how you try
2 to do it, combining these issues, probably not going
3 to work.

4 Now, if you look at what is in front of
5 us, it's just to give OCD the opportunity to go for
6 the primacy, to apply. You know, they are not there
7 yet. You know, if you listen to what NMOGA was
8 saying, clearly.

9 The question is, without CO2 ownership,
10 without mineral estate, without unitization, can OCD
11 still proceed and apply for the primacy through EPA?
12 The answer is, yes. So why not be just declared and
13 say that, bring down another rulemaking, just focusing
14 on these issues? Because they cannot be done
15 separately. I know how you -- I know that you are
16 trying to see if there's a common ground, but I don't
17 see it.

18 MR. CHANG: But I appreciate that. I'm
19 just -- the motion, though, specific doesn't actually
20 ask for -- or at least the motion, as I understood it
21 from Commissioner Czoski, doesn't actually ask for
22 unitization or anything like that. It merely asks for
23 a 60-day extension; right?

24 So I'm trying to see if there's a way
25 for us to meet her in the middle somewhere as a

1 courtesy. But certainly, I understand if Commissioner
2 Ampomah's preference is to stick with September 11th
3 and October 9th. But it is -- the motion in front of
4 us isn't to deal with a scope, whether or not that
5 might be motivating the motion. The motion is only
6 whether to extend deadlines by 60 days, as I
7 understand it.

8 MR. AMPOMAH: No, I thought extend so
9 these issues could be addressed. That's how I
10 understand it.

11 MR. CHANG: I didn't hear that in the
12 motion, but you're welcome to clarify what you're
13 trying -- you're welcome to clarify.

14 MS. CZOSKI: I mean, I'd like some --
15 these issues and other issues that have been raised to
16 be addressed, you know, within the next -- you know,
17 during that extra time period.

18 MR. AMPOMAH: I mean, all the issues
19 that we more or less recommended for OCD to consider,
20 that is within the scope of the hearing that we've had
21 here. And yeah, we are able to do that. But anything
22 outside that scope, I feel like there's a big stretch.

23 MR. CHANG: So in that case, could we
24 just have -- you don't need the explanation or the
25 preamble, but just articulate just for the record, so

1 we're very clear on what exactly is being moved here.
2 Could you just read the specific motion for us again
3 so we know what we're voting on?

4 MS. CZOSKI: Sure. Do you want --
5 should I just read the -- should I say my whole
6 statement again, or?

7 MR. CHANG: Just specifically the
8 motion part. So I don't need the explanation of what,
9 but just tell me what you're moving.

10 MS. CZOSKI: I move to table this
11 hearing for 60 days and re-adjourn at a later time to
12 see where we are with these issues.

13 MR. CHANG: That's not the hard part
14 because it's 60 days re-adjourned, but --

15 MR. AMPOMAH: The issues.

16 MR. CHANG: Okay.

17 MR. AMPOMAH: Yeah.

18 MR. CHANG: Undefined issues. But fair
19 enough. Okay. The way you understood it is that
20 unitization is the specific issues.

21 MR. AMPOMAH: Mr. Chair, she did define
22 those issues.

23 MS. CZOSKI: Oh, there's other
24 issues -- you know, there's multiple issues brought up
25 in this hearing, not just --

1 MR. AMPOMAH: I mean, those ones, like
2 we've already discussed. I mean, Felicia already
3 asked OCD, the applicant, "How long do you need to
4 address all these issues that were raised as part of
5 the hearing?" You already communicated.

6 So the other issues that were not
7 really discussed, no evidence -- no evidentiary
8 discussions were held on. Those ones, you have to
9 separate that from the issues that were discussed,
10 that OCD already said, "We need this time to really
11 come to, let's say, with the red lines."

12 MR. CHANG: Okay. Any further
13 discussion on the motion then? Okay. Well, then I'll
14 ask for roll call.

15 MS. APODACA: Okay.

16 Commissioner Ampomah?

17 MR. AMPOMAH: Denied.

18 MS. APODACA: Commissioner Chang?

19 MR. CHANG: I'll vote no.

20 MS. APODACA: And Commissioner Czoski?

21 MS. CZOSKI: I vote yes.

22 MR. CHANG: Okay. In that case, my
23 understanding is that September 11th and October 9th
24 deadlines remain; okay? I presume our hearing officer
25 will put that in an order for the parties in writing.

1 I don't believe we have any other
2 business -- and somebody can correct me if I'm
3 remembering my agenda wrong -- but I don't believe
4 there's any other business for this hearing at this
5 time then. In that case, we will recess up until
6 tomorrow morning for public comment. 9 o'clock.
7 Thank you all very much.

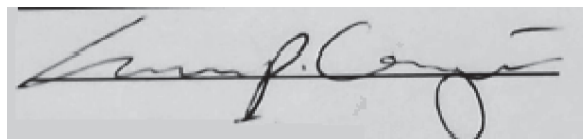
8 (Whereupon, at 3:57 p.m., the
9 proceeding was concluded.)

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CERTIFICATE

I, GERALD ARAGON, 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 handwritten signature in black ink, appearing to read "Gerald Aragon", written over a horizontal line.

GERALD ARAGON
Notary Public in and for the
State of New Mexico

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CERTIFICATE OF TRANSCRIBER

I, KEVIN JOSEPH KAM, 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.



KEVIN JOSEPH KAM

[& - 19.15.43.903a]

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