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STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Case No. 23580

Moderated by Felicia Orth
Wednesday, November 13, 2024
8:33 a.m.

Wendell Chino Building
1220 South Saint Francis Drive
Santa Fe, NM 87505

Reported by: James Cogswell
JOB NO.: 6962988

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A P P E A R A N C E S

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1 ALSO PRESENT:

2 Gerasimos Razatos, Acting Director, State of New
3 Mexico Oil Conservation Division

4 Greg Bloom, Commissioner, State of New Mexico Oil
5 Conservation Commission

6 Dr. William Ampomah, Commissioner, State of New
7 Mexico Oil Conservation Commission

8 Sheila Apodaca, Law Clerk, State of New Mexico
9 Oil Conservation Commission

10 Madai Corral, Law Clerk, State of New Mexico Oil
11 Conservation Commission

12 Nicholas R. Maxwell, Participant from Lea County
13 (by videoconference)

14 Ian Colburn, Member of Public (by
15 videoconference)

16 Kristen Gamboa, Member of Public (by
17 videoconference)

18 Ed Ashmead, Member of Public (by videoconference)

19 Catana Lopez, Member of Public (by
20 videoconference)

21 Elizabeth Holland, Member of Public (by
22 videoconference)

23 Paula Claycomb, Member of Public (by
24 videoconference)

25

1 ALSO PRESENT (Cont'd)
2 Robert Bernstein, Member of Public (by
3 videoconference)
4 Barbara Wisoff, Member of Public (by
5 videoconference)
6 Patricia Roybal Caballero, New Mexico State
7 Representative (by videoconference)
8 Byron McMillan, Member of Public (by
9 videoconference)
10 Ruth Striegel, Member of Public (by
11 videoconference)
12 Peggy Baker, Member of Public (by
13 videoconference)
14 Sam Hitt, Member of Public (by videoconference)
15 Bobbe Besold, Member of Public
16 Glenn Wikle, Member of Public
17 Lara Adler, Member of Public (by videoconference)
18 Dianna Woods, Member of Public (by
19 videoconference)

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I N D E X

WITNESS:	DX	CX	RDX	RCX
JOHN SPEAR				
By Mr. Davis	35			
By Mr. Rankin		38		
By Mr. Tremaine		65		
By Mr. Razatos		83		
By Mr. Bloom		86		
By Dr. Ampomah		97		
MELISSA TROUTMAN				
By Mr. Davis	118		136	
By Ms. Mulcahy		120		
By Mr. Tremaine		122		
By Mr. Razatos		125		
By Mr. Bloom		127		
By Dr. Ampomah		133		
COURT SANDAU				
By Mr. Tremaine	140			
By Ms. Mulcahy		162		
By Mr. Davis		170		
By Mr. Razatos		186		
By Mr. Bloom		194		
By Dr. Ampomah		200		

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I N D E X (Cont'd)

WITNESS:	DX	CX	RDX	RCX
ERIK MARTIN				
By Mr. Tremaine	208			
By Ms. Mulcahy		216		
By Mr. Davis		217		
By Mr. Razatos		232		
By Dr. Ampomah		237		
BRANDON POWELL				
By Mr. Tremaine	244			

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E X H I B I T S

NO.	DESCRIPTION	ID/EVD
	WildEarth Guardians:	
Exhibit 3	NMED Water Resources & Management Webpage	136/137
Exhibit 78	John Spear - CV	36/ 37
Exhibit 79	John Spear - Testimony	35/ 37
Exhibit 80	Amundson, K.K., M.A. Borton and M.J. Wilkins. 2024. Nature Reviews Microbiology doi: 10.1038/s41579-024-01110-5	--/ 37
Exhibit 81	ATSDR. PFAS Information for Clinicians Jan 18, 2024	--/ 37
Exhibit 82	Jarvis, A.L., J.R. Justice, M.C. Elias, B. Schnitker and K. Gallagher. 2021. Environmental Toxicology and Chemistry, 40(9): 2425-2442	--/ 37
Exhibit 83	Sowards, J.W., C.H.D. Corrosion Science 79: 128-138	50/ 37

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E X H I B I T S

NO.	DESCRIPTION	ID/EVD
	WildEarth Guardians:	
Exhibit 84	Spear, J.R., J.J. Walker, T. McCollom and N.R. Pace. 2005. PNAS, 102(7): 2555-2560	--/ 37
Exhibit 85	Gold, T. 1992. Proc. Natl. Acad. Sci. 89: 6045-6049	--/ 37
Exhibit 86	Kraus, E.A., D. Nothaft, B.W. Stamps, K.R. Remphert, E.T. Ellison, J.M. Matter, A.S. Templeton, E.S. Boyd and J.R. Spear. 2021. Applied and Environmental Microbiology, 87(2): 1 - 18, e02068-20, doi: 10.1128 AEM.02068-20	--/ 37
Exhibit 87	Huang, S. and P.R. Jaffe. 2019. Environmental Science and Technology, 53: 11410-11419	--/ 37

1	E X H I B I T S (Cont'd)		
2	NO.	DESCRIPTION	ID/EVD
3	WildEarth Guardians:		
4	Exhibit 88	W. Jiang et al. 2022.	
5		Journal of Hazardous	
6		Materials, Volume 430,	
7		15 May 2022, 128409	54/ 37
8	Exhibit 89-A	Fuge, D.M. 11 July 2024.	
9		State of New Mexico, Energy,	
10		Minerals and Natural	
11		Resources Department	34/ 37
12	Exhibit 89-B	Karanam, V., Z. Lu and J-W.	
13		Kim. 2024. Geophysical	
14		Research Letters doi:	
15		10.1029/2024GL109435	34/ 37
16	Exhibit 90	CV Melissa Troutman	119/120
17	Exhibit 91	Direct Testimony of Melissa	118/120
18		Troutman	
19	Exhibit 92	Excel Spreadsheet from	
20		OCD Incident Database	121/120
21	Exhibit 93	Excel Spreadsheet from	
22		OCD Spills Database	121/120
23			
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E X H I B I T S (Cont'd)

NO.	DESCRIPTION	ID/EVD
OCD:		
Exhibit 1	OCD Definition of PFAS	162/247
Exhibit 2	Mr. Powell Direct Testimony	244/247
Exhibit 3	Mr. Powell CV	245/247
Exhibit 4	Slides - OCD Proposed Changes	245/247
Exhibit 5	OCD Exhibit 5	/247
Exhibit 6	OCD Exhibit 5	/247
Exhibit 7	Dr. Martin CV	209/209
Exhibit 8	Dr. Sandau CV	140/162
Exhibit 9	Dr. Martin Direct Testimony	209/209
Exhibit 10	Dr. Sandau Direct Testimony	140/162
Exhibit 11	Slides - Rebuttal Testimony	246/247

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

2 HEARING OFFICER: Good morning.

3 We are on day two of the hearing in
4 Case Number 23580. These are proposed amendments to
5 The Commission's rules to address chemical disclosure
6 and the use of PFAS substances in oil and gas
7 extraction.

8 I'm going to invite public comment
9 before we return to the technical case. I will ask
10 those on the platform to raise your hand -- I see a
11 couple of hands raised already -- if you'd like to
12 offer public comment. Please know that I can only
13 accept public comment from you once, so if you've
14 offered comment yesterday, I will not call on you
15 again today.

16 That comment is limited to three
17 minutes. If you have something longer to offer The
18 Commission, please put it in writing, and submit that
19 written comment before 5 p.m. on Friday of this week.
20 That's November 15th.

21 I will ask you to state and spell your
22 name for the transcript, and I will ask if you swear
23 or affirm to tell the truth. So let's start with Ed.
24 I don't see a last name.

25 Ed, can you hear me?

1 MR. ASHMEAD: Yes. This is Edward
2 Ashmead. A-S-H-M-E-A-D.

3 HEARING OFFICER: All right.

4 MR. ASHMEAD: I guess you're talking to
5 me?

6 HEARING OFFICER: Yes. Thank you. Do
7 you swear or affirm to tell the truth?

8 MR. ASHMEAD: I do.

9 HEARING OFFICER: Thank you. I'll
10 start your three minutes.

11 MR. ASHMEAD: Good morning. Water is
12 our most precious resource, especially here in the
13 long-term drought-ridden west, where it is in chronic
14 short supply despite the sporadic downpour snowfall.
15 Have any of you on the OCC or in the petrochemical
16 industry read "Cadillac Desert, The American West and
17 its Disappearing Water" by Marc Reisner? Or William
18 deBuys's "A Great Aridness, Climate Change and the
19 Future of the American Southwest"?

20 These should be required reading for
21 they well decry the dearth of this most precious
22 resource and the impacts we are seeing regarding its
23 squandering. To contaminate our surface and
24 groundwaters with so-called forever chemicals and
25 other hazardous, unidentified compounds is foolhardy

1 in the extreme.

2 As it is, we already consume an
3 untenable amount of harmful chemicals, as they are
4 ubiquitous now, found in everything from our dental
5 floss to our water bottles. Speaking of water
6 bottles, a few New Mexican communities have been
7 forced to resort to bottled water due to their tap
8 water being contaminated with PFAS.

9 Residents of those communities are even
10 banned from hunting traditional meat sources due to
11 the uptake of PFAS from the environment by wildlife.
12 There is no known safe, minimal level of exposure to
13 PFAS. Cancer rates have skyrocketed, and there seems
14 little doubt the culprit is harmful chemical exposure.

15 New Mexicans have a right to
16 uncontaminated waters. We deserve a ban on the use of
17 "forever chemicals" injected into our lands and waters
18 by the petrochemical industry, and like California and
19 Colorado, to know the identity of whatever chemicals
20 are used in fracking. Thank you.

21 HEARING OFFICER: Thank you,
22 Mr. Ashley.

23 MR. ASHMEAD: Ashmead.

24 HEARING OFFICER: Ashmead. Sorry.

25 Number 2? There we go. Ian Colburn.

1 Can you unmute yourself? Ian Colburn?

2 He may have stepped away.

3 Do you have a way of asking him to
4 unmute, Sheila? No? Okay.

5 Let's move, then, to the next Number 2.
6 There we go. Catana. Catana Lopez?

7 MS. LOPEZ: Yes. It's spelled
8 C-A-T-A-N-A L-O-P-E-Z, for the record.

9 HEARING OFFICER: Thank you.

10 MS. LOPEZ: Good morning.

11 HEARING OFFICER: Do you swear or
12 affirm to tell the truth?

13 MS. LOPEZ: I do.

14 HEARING OFFICER: All right. And raise
15 your voice just a little bit. You're a little quiet.
16 I'll start your three minutes.

17 MS. LOPEZ: Okie doke.

18 HEARING OFFICER: Go ahead.

19 MS. LOPEZ: Sorry. I was trying to
20 raise my hand, my -- I --

21 Good morning, Madam Hearing Examiner,
22 Commissioners. My name is Catana Lopez. My family
23 has lived in New Mexico for generations, both on this
24 side of the mountains, and in San Miguel County, on
25 the other side.

1 I come before you today as a mother who
2 knows the daily way of worrying about my health and my
3 daughter's health, and about the legacy of
4 contamination we are leaving for our children.
5 PFAS -- PFAS chemicals, persistent, toxic, and
6 harmful, pose a grave threat to public health,
7 especially when used in oil and gas operations that
8 inject them underground, where they can seep into our
9 groundwater.

10 We already live surrounded by harmful
11 chemicals. Allowing oil and gas to inject PFAS in
12 an -- is an added danger we cannot ignore. PFAS
13 exposure has been linked to serious health issues,
14 including cancer, such as kidney, testicular, and
15 thyroid cancer, high cholesterol, reproductive harm,
16 and developmental toxicity in children.

17 These chemicals can cross the placenta,
18 and accumulate in breast milk. As a mother, it is
19 terrifying and unacceptable to think that my daughter
20 may face increased cancer risks or reproductive
21 challenges because of exposure to chemicals like PFAS.

22 The Physicians for Social
23 Responsibility Report and numerous studies have
24 documented the pervasiveness and harm of PFAS. Yet
25 the oil and gas industry continues to use them without

1 sufficient oversight.

2 New Mexico relies on groundwater for
3 80 percent of its public water supply. When oil and
4 gas operations inject PFAS-containing substances
5 underground, they put our water, and by extension, our
6 families in serious danger.

7 This risk is not hypothetical. It is
8 illustrated daily by spills and leaks of fracking
9 wastewater, averaging four spills every day across the
10 state. The companies responsible for these operations
11 cannot -- cannot guarantee that PFAS will not end up
12 in our drinking water.

13 What makes this situation even more
14 troubling is that oil and gas operators themselves
15 have testified that they don't need PFAS. There is no
16 valid reason for their continued use. This is about
17 protecting industry profits, not our health.

18 The refusal to eliminate a chemical
19 they admit is unnecessary shows a blatant disregard
20 for our safety. Full chemical disclosure is a basic
21 responsibility. We, the public, have the right to
22 know what chemicals are being used, injected and
23 released into our environment.

24 We must protect ourselves, our
25 children, and future generations from hidden dangers

1 of PFAS. Banning PFAS in oil and gas operations is
2 essential to safeguarding public health and preventing
3 needless suffering.

4 No child -- no family in New Mexico
5 should have to worry that their water contains
6 dangerous and unnecessary chemicals. I urge you to
7 act now. Ban PFAS in oil and gas operations, demand
8 full chemical disclosure, and protect the health and
9 safety of every New Mexican. Our families depend on
10 it. Thank you.

11 HEARING OFFICER: Thank you, Ms. Lopez.
12 Let's see. Elizabeth Holland?

13 MS. HOLLAND: Yes. I'm here.

14 HEARING OFFICER: Hello. If you would
15 spell your name for the record, please?

16 MS. HOLLAND: Elizabeth Holland.
17 E-L-I-Z-A-B-E-T-H H-O-L-L-A-N-D.

18 HEARING OFFICER: Do you swear or
19 affirm to tell the truth?

20 MS. HOLLAND: Yes.

21 HEARING OFFICER: All right. I'll
22 start your three minutes.

23 MS. HOLLAND: Good morning, all, and
24 Commissioners. Thank you for allowing me the
25 opportunity to give public comment on this important

1 topic in support of this rule to prohibit the use of
2 PFAS and all other undisclosed chemicals in oil and
3 gas extraction processes here in New Mexico.

4 We know that there is no level -- no
5 safe level of exposure to PFAS without risk of
6 potentially serious health impacts. The use of these
7 so-called forever chemicals, puts New Mexicans, and
8 more and more, our young people, at greater risk for a
9 multitude of cancers and other diseases. And it is
10 despicable that oil and gas companies have the ability
11 to keep the use of them secret.

12 I am in full support of this proposed
13 rule to keep PFAS out of oil and gas production, and
14 urge the -- this Commission, the OCC, to take the step
15 to require companies to disclose what -- what
16 chemicals are being used.

17 And I'll also like to mention that I am
18 a member of Demand Nuclear Abolition, a grassroots
19 organization, anti-nuclear organization, here in New
20 Mexico. And compounded with, already, risks of
21 radiation exposure in the state, especially in the
22 corridor in the southeast corner of the state where
23 these gas and oil drills are being done, the added
24 risks of PFAS only adds to the health risk for our New
25 Mexican communities.

1 And, yeah. Thank you so much.

2 HEARING OFFICER: Thank you,
3 Ms. Holland.

4 Let's see. Paula Claycomb?

5 MS. CLAYCOMB: Yes. I'm here.

6 HEARING OFFICER: If you would spell
7 your name for the record please?

8 MS. CLAYCOMB: P-A-U-L-A, surname
9 C-L-A-Y-C-O-M-B.

10 HEARING OFFICER: And do you swear or
11 affirm to tell the truth?

12 MS. CLAYCOMB: I do.

13 HEARING OFFICER: I'll start your three
14 minutes.

15 MS. CLAYCOMB: Thank you very much.

16 Good morning. My thanks to the New
17 Mexico Oil Conservation Commission for providing
18 options for public comment on the rule proposed by
19 WildEarth Guardians. I support the rule -- or the
20 draft rule.

21 I know that soliciting input from the
22 public is time consuming and complicated. It's also a
23 hallmark of democracy, and I really appreciate your
24 efforts. I live in Taos, where this past Sunday, I
25 participated in a well-attended community resilience

1 forum called Del Fuego: Wildfire in Focus.

2 Listening to Rene Romero former fuels
3 manager for Taos Pueblo, and also thinking about this
4 week's hearings by your Commission, I was struck, as I
5 so often am these days, by New Mexicans' love for our
6 land, water, flora, and fauna.

7 Mr. Romero reminded the audience of a
8 slogan so well known in our state that it could be the
9 official motto, "water is life." I would be willing
10 to bet that whenever any of us hears, reads, or speaks
11 the words "water is life," we are envisioning clean,
12 pure water, water that does not contain toxic
13 ingredients like perfluoroalkyl and polyfluoroalkyl
14 substances. Even their names sound scary, don't they?

15 As you know, the oil and gas industry
16 claimed that divulging its trade secrets will
17 compromise profits and drive their business out of New
18 Mexico. Hardly. They know they have a good thing
19 going in this state.

20 Plus, chemical disclosure in other
21 states -- or chemical disclosure requirements in other
22 states -- I think of California and Colorado -- have
23 not slowed drilling in those states.

24 I will end on a personal note. PFAS
25 has been linked to cancer. It knows no gender or age.

1 My sister died from breast cancer in Butte, Montana,
2 where the copper industry has long used PFAS in
3 reaching, or floating and concentrating vanadium
4 compounds.

5 While her illness was not attributed
6 directly to such contamination, it was a shock when,
7 eight years after her death, her 24-year-old son
8 developed testicular cancer, which one oncologist said
9 could be linked to PFAS. Only further testing would
10 reveal the truth.

11 Thankfully, my nephew is doing well
12 enough now, but he cannot father any children, and he
13 has torso-length scars from two major surgeries. I do
14 not wish either experience for any of you or your
15 families. Please keep PFAS out of our precious
16 waters. Thank you.

17 HEARING OFFICER: Thank you,
18 Ms. Claycomb.

19 Let's see. Now, we already heard from
20 Elizabeth Holland. There. Rob.

21 Rob? I just see the name Rob?

22 MR. BERNSTEIN: Yeah. I'm Robert
23 Bernstein. I'm a physician.

24 HEARING OFFICER: Hold on. Do you
25 swear or --

1 MR. BERNSTEIN: Oh. I'm sorry.

2 HEARING OFFICER: -- affirm to tell the
3 truth?

4 MR. BERNSTEIN: Yes, of course I do.
5 Thank you.

6 HEARING OFFICER: Okay. I'm going to
7 start your three minutes.

8 MR. BERNSTEIN: Okay. Okay. I'm a
9 physician. I've lived in New Mexico for about 40
10 years. Worked at La Familia Medical Center, and
11 currently work at Santo Domingo Pueblo Health Center.

12 I think the other -- some of the other
13 speakers have already talked about the dangers of
14 PFAS, and I'll keep it short. This -- this stuff
15 shouldn't be in our water. It gets into our water
16 from fracking fluids. It's extremely toxic. These
17 chemicals are extremely toxic.

18 So just in summary, as a doctor and a
19 New Mexico resident for all these years, the father of
20 two kids and four grandchildren, I strongly support
21 the adoption of the rule, because there is absolutely
22 no safe level.

23 So I -- I'd ask or plead with the Oil
24 Conservation Commission to use their power to protect
25 all of us. Thank you for your time, and I

1 appreciate -- I appreciate being allowed to speak.

2 HEARING OFFICER: Thank you.

3 Dr. Bernstein. Would you spell your last name,
4 please?

5 MR. BERNSTEIN: Oh. I'm sorry. Last
6 name is B-E-R-N-S as in Sierra -T Tango -E-I-N.

7 HEARING OFFICER: Thank you very much.

8 MR. BERNSTEIN: And thank you very
9 much.

10 HEARING OFFICER: All right. Next we
11 have -- let's see. Oh, there.

12 Barbara Wisoff?

13 MS. WISOFF: My name is spelled Barbara
14 B-A-R-B-A-R-A Wisoff W-I-S-O-F-F.

15 HEARING OFFICER: Thank you. Do you
16 swear or affirm to tell the truth?

17 MS. WISOFF: I do.

18 HEARING OFFICER: I'll start your three
19 minutes.

20 MS. WISOFF: Good morning. I am a
21 concerned constituent residing in Albuquerque. I have
22 asthma. And aside from my own health concerns, I care
23 deeply about the health of my grandchildren, and adult
24 family and friends, and all living things here in New
25 Mexico and everywhere else whose health is impacted by

1 New Mexico's excessive contribution to pollution due
2 to poorly regulated oil and gas extraction, and
3 insufficient contamination remediation.

4 By all accounts, PFAS and undisclosed
5 chemicals used in oil and gas extraction are extremely
6 harmful to our water supply, to the on-site workers,
7 and to surrounding communities. Trade secrets are
8 allowed by New Mexico's minimal regulation of the oil
9 and gas industries.

10 Rule against trade secrets. And rule
11 for full chemical disclosure to protect our water
12 supply from further contamination. The waste of our
13 diminishing water supply by oil and gas extraction is
14 unconscionable. There is no known or tried process
15 for cleaning the toxic sludge from fracking.

16 There are three commissioners on the
17 OCC, according to the EMNRD website, but no names are
18 listed. And subsequently, there is no contact
19 information for these three commissioners. There is
20 no direct contact information for the five members of
21 the OCD Bureau.

22 The print for the engineering and
23 inspection program is so tiny as to be nearly
24 impossible to read. This is what the public is given.
25 I magnified the page in sections and took screenshots

1 to be able to read the information. And the word
2 "fracking" does not appear anywhere on the EMNRD
3 website.

4 Avoidance of printed facts on a New
5 Mexico government website is deceitful. What does
6 this say about the EMNRD's public transparency and for
7 whom the EMNRD works? I quote, "Our website has been
8 designed to provide you with information about doing
9 business with the Oil Conservation Division of New
10 Mexico, as well as to provide access to forms,
11 services and data provided by the division."

12 Putting business profits above the
13 health of people in our water supply is wrong.
14 According to New Mexico Environment Department,
15 approximately 78 percent of New Mexicans depend on
16 groundwater for drinking water. 81 percent of New
17 Mexicans are served by public systems with water
18 derived from groundwater sources.

19 And over 170,000 New Mexicans depend on
20 private wells for drinking water. Groundwater makes
21 up nearly half of the total water annually withdrawn
22 for all uses in New Mexico, including agriculture and
23 industry, and is the only practicable source of water
24 in many areas of the state.

25 I hope that you will serve all New

1 Mexicans by banning PFAS, and requiring full chemical
2 disclosure used by oil and gas, because once oil and
3 gas poisons our wells and waterways, the water is
4 contaminated forever. Thank you very much.

5 HEARING OFFICER: Thank you,
6 Ms. Wisoff. I'd like to just address one thing in
7 response to your comment.

8 To the extent anyone has a written
9 public comment or other input for the Oil Conservation
10 Commission, the public notice for this hearing and
11 other hearings which appears on the webpage, would
12 have you send that to Sheila Apodaca. She is The
13 Commission administrator.

14 And yes, it is an intentional decision
15 for most boards or commissions that I conduct hearings
16 for, for the State of New Mexico, not to provide
17 personal contact information for board members or
18 commissioners.

19 I will tell you that some of our
20 environmental improvement board members, for example,
21 were harassed in their homes and yards last year as
22 part of a rule-making around clean cars. If you have
23 something to say to this commission, please put it in
24 writing and submit it to Sheila Apodaca.

25 Sheila, I think we can go back to

1 Mr. Colburn.

2 MR. COLBURN: Yeah. Good morning. Can
3 you guys hear me okay?

4 HEARING OFFICER: Yes.

5 MR. COLBURN: C-O-L-B-U-R-N.

6 HEARING OFFICER: Do you -- virtual
7 connectivity interruption --

8 MR. COLBURN: Yes, I do.

9 HEARING OFFICER: Thank you. I'll
10 start your three minutes.

11 MR. COLBURN: Thank you so much.

12 Good morning, everyone. Today, I'm
13 speaking in support of the WildEarth Guardians'
14 proposed rule to prohibit the use of PFAS in the oil
15 and gas industry, as well as bring New Mexico in line
16 with other new green states in regarding to
17 transparency in the oil and gas industry.

18 Some context, I'm speaking to you from
19 Albuquerque. I'm a small business owner. I'm a
20 vegetable farmer. We own two-and-a-half acres in the
21 South Valley, and grow more than 20,000 pounds of
22 organic veggies that end up in Albuquerque, and around
23 the state.

24 So with that said, I understand the
25 economic prosperity that engine -- energy production

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1 has brought and continues to bring our state, as well
2 as the importance of energy independence. However,
3 this proposed rule is not an attack on our state's
4 ability to take care of its people, or utilize its
5 national resources, or even industry.

6 It aims to fulfill that which all New
7 Mexicans are -- are given -- constitution by our
8 government, and that is the right to safety and
9 happiness, as well as to obtain and protect property.
10 The use of PFAS is extremely detrimental to human
11 health and wellbeing, but also to property holders
12 around the state.

13 And agricultural perspective.
14 Agriculture in New Mexico is a \$3 billion plus
15 industry. And I hope I don't have to remind anyone
16 that chile does not grow without water, nor do pecans,
17 onions, peanuts, or the thousands of pounds of fresh
18 produce grown by small farms like my own around the
19 state.

20 Contaminated water is taken up by
21 plants, and those contaminants enter the fruits and
22 vegetables which we ultimately consume. And
23 those -- all those agricultural products I listed are
24 consumed by New Mexicans, but also exported to fuel
25 the economy of our state.

1 And there have been many instances
2 where producers have suffered economic loss due to
3 PFAS contamination, from the culling of thousands of
4 cattle, to the abandoning of entire farms, entire farm
5 land taken out production due to PFAS contamination.

6 Anything grown there -- become
7 contaminated as well. And of course, really quickly
8 go over the negative impacts that have been shown,
9 by -- from exposure to PFAS. They're wide ranging,
10 including a number of cancer -- cancers that other
11 speakers this morning have so eloquently shared -- the
12 scientific literature.

13 There's thyroid disease, kidney
14 disease, decreased immune response, lower birth rate,
15 developmental delay in children. Also, birth defects,
16 preeclampsia, high blood pressure in pregnant women.
17 And the latest science shows that there is no safe
18 level of exposure to chemicals, particular PFAS
19 chemicals.

20 So as a farmer, a small business owner
21 in the arid Southwest, I'm well aware of our
22 ability -- excuse me, our absolute reliance on our
23 precious and precarious water resources. Maintaining
24 access to water in sufficient quantity, but also
25 quality is essential to the viability of our business,

1 and our state's ability to feed itself.

2 The earth's natural water cycle
3 connects all water sources across the world. To
4 believe that one water source somewhere in New Mexico
5 will be able to keep separate from water that flows
6 down the Rio Grande, refills our -- and then is used
7 by farms across the state, is naive and incorrect.

8 HEARING OFFICER: Please wrap up,
9 Mr. Colburn.

10 MR. COLBURN: Yeah.

11 And -- and that that ends my comments.
12 Thank you guys, so much. Everyone have a lovely day.

13 HEARING OFFICER: Thank you very much.

14 Let me ask if there's anyone else on
15 the platform who would like to offer a public comment
16 this morning? There will be other opportunities to
17 offer a public comment.

18 Oh. I see Kristen Gamboa.

19 MS. GAMBOA: Yes. Good morning.

20 HEARING OFFICER: Hello. Would you
21 spell your name for the transcript please? -- virtual
22 connectivity interruption -- or affirm to tell the
23 truth?

24 MS. GAMBOA: Yes.

25 HEARING OFFICER: I'll start your three

1 minutes.

2 MS. GAMBOA: Awesome.

3 HEARING OFFICER: Well, good morning,
4 everyone. I am Kristen Gamboa, executive director of
5 the Carlsbad Department of Development, which is an
6 economic development organization here in Carlsbad,
7 New Mexico. I'd like to address some of the concerns
8 around PFAS use in hydraulic fracturing.

9 The oil and gas industry follows strict
10 regulations in New Mexico, with full transparency
11 about chemicals used in fracking, and disclosed
12 through FracFocus. In fact, PFAS are not
13 intentionally used in operations.

14 Any trace PFAS that appears is likely
15 from environmental sources, even, like, from municipal
16 water, not from oil and gas activity. PFAS are found
17 in a wide range of everyday products in many
18 industries, but oil and gas is not a significant
19 contributor.

20 In fact, EPA's own PFAS Focus List
21 don't even include oil and gas. In short, I support
22 effective evidence-based legislation that prevents
23 intentional PFAS use, while recognizing where the real
24 sources lie. That is it. Thank you for your time and
25 consideration.

1 HEARING OFFICER: Thank you Ms. Gamboa.

2 MS. GAMBOA: Uh-huh.

3 HEARING OFFICER: Is there anyone else
4 on the platform who has not yet offered a public
5 comment who would like to do so now? Again, there
6 will be other opportunities. No?

7 And let me just double check in the
8 room. Is there anyone in the room who would like to
9 offer non-technical public comment this morning? No?

10 All right. Thank you very much. You
11 got us right to 9 a.m., that perfect timing. We'll
12 return to the technical case, and let me just ask the
13 parties --

14 Counsel, is there anything we need to
15 talk about before I ask Mr. Davis to call his next
16 witness? Nope? All right.

17 Mr. Davis?

18 MR. DAVIS: Good morning, Madam Hearing
19 Officer, Commissioners. WildEarth Guardians calls
20 Professor John Spear. And while and
21 Mr. Spear -- Dr. Spear is making his way over to the
22 witness stand. I wanted to alert the parties and The
23 Commission that there is a discrepancy in the
24 citations, and the actual labeling of a couple of his
25 exhibits.

1 And so I just wanted to make sure that
2 everyone knows that the Exhibit 88 -- I'm sorry,
3 Exhibit 89-A is listed in Dr. Spear's citations as 88,
4 but that is the Fuge exhibit that should -- that is
5 actually Exhibit 89-A. So Fuge is 89-A, if you're
6 looking for it.

7 (WildEarth Guardians Exhibit 89-A was
8 marked for identification.)

9 And then the Karanam exhibit is listed
10 in Dr. Spear's citations as Exhibit 89, and that is
11 actually labeled as 89-B. So if you are looking
12 for it, you'll be in the vicinity, but I wanted to
13 make sure everyone knew where to find those. And
14 apologies -- my apologies for the discrepancy.

15 (WildEarth Guardians Exhibit 89-B was
16 marked for identification.)

17 And I believe the witness is ready to
18 be sworn in if there aren't any questions about that?

19 HEARING OFFICER: Yes, Ms. Mulcahy?

20 MS. MULCAHY: I have no questions,
21 Madam Hearing Officer, about what Mr. Davis just said.
22 I just wanted to -- before we get started, he spoke up
23 too quick; I couldn't get in there. The exhibit
24 yesterday from Mr. Horwitt's testimony, that I
25 projected on the screen with the red highlights; I

1 just wanted to make you aware that I emailed a copy of
2 that to you, and to all of the parties this morning,
3 Madam Hearing Officer.

4 HEARING OFFICER: Thank you so much.
5 We'll have a chance to look at that a little later.

6 Dr. Spear, do you swear or affirm to
7 tell the truth?

8 DR. SPEAR: I do.

9 HEARING OFFICER: Thank you very much.
10 Mr. Davis?

11 DIRECT EXAMINATION

12 BY MR. DAVIS:

13 Q Good morning Dr. Spear. Could you please
14 state and spell your name for the record?

15 A John -- it's John J-O-H-N Spear S-P-E-AR.

16 Q Did you prepare direct testimony for this
17 proceeding?

18 A I did.

19 Q Is that exhibit the WildEarth Guardians
20 Exhibit 79?

21 (WildEarth Guardians Exhibit 79 was
22 marked for identification.)

23 A Yes.

24 Q And other than the exhibit issue that I just
25 made the parties and Commission aware of, do you have

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1 any changes to that testimony?

2 A I do not.

3 Q Did you review and rely on any documents to
4 prepare your testimony?

5 A Yes. I did. They're listed in an -- the
6 end as references.

7 Q And that would be WildEarth Guardians
8 Exhibits 80 through 89-B; is that correct?

9 A Yes.

10 Q Your CV is also an exhibit to your
11 testimony; is that correct?

12 A Yes.

13 Q Is that WildEarth Guardians Exhibit 78?

14 (WildEarth Guardians Exhibit 78 was
15 marked for identification.)

16 A Yes.

17 Q Is your written testimony true and accurate
18 to the best of your knowledge?

19 A Yes.

20 Q Do you adopt your written direct testimony
21 at WildEarth Guardians Exhibit 79 as your sworn
22 testimony today?

23 A Yes.

24 MR. DAVIS: Madam Hearing Officer, this
25 witness is available for questions from the parties

1 and The Commission.

2 HEARING OFFICER: Are you going to move
3 the exhibits?

4 MR. DAVIS: Oh. Thank you. WildEarth
5 Guardians moves Exhibits 78 through 89-B.

6 HEARING OFFICER: Okay. Any
7 objections?

8 Mr. Rankin?

9 MR. RANKIN: No objections, Madam.
10 Hearing Officer.

11 HEARING OFFICER: All right. I'll
12 pause for a moment. Objection? No? All right.
13 Thank you. Exhibit 78 through 89-B are admitted.

14 (WildEarth Guardians Exhibits 78
15 through 89-B were received
16 into evidence.)

17 HEARING OFFICER: And it -- will it be
18 you, Mr. Rankin --

19 MR. RANKIN: Good morning.

20 HEARING OFFICER: -- asking questions?

21 MR. RANKIN: Good morning. Yes, it
22 will be me, Madam Hearing Officer.

23 Good morning Commissioners, Members of
24 The Commission. May it please The Commission.

25 //

1 CROSS-EXAMINATION

2 BY MR. RANKIN:

3 Q Good morning, Professor Spear. How are you
4 today?

5 A Doing well. Yourself?

6 Q I'm good. I'm -- my name's Adam Rankin.
7 I'm the counsel here today for NMOGA. I want to do my
8 best to share my screen with you, because I think it's
9 easier just to walk through your exhibits while we're
10 looking at the same document. Let me know if you can
11 see -- do you see the image of the hearing on your
12 screen as well?

13 A I -- I see, right now, an image of myself.

14 Q Okay. Good. That's not what I want.

15 A I see what you see on that screen up there.

16 Q Okay. So you do see the -- okay. That
17 works well enough, I suppose. So showing on your
18 screen, do you see the Exhibit 78, which is your CV or
19 Curriculum Vitae?

20 A Yes.

21 Q And this has all your education and
22 training; correct?

23 A That is correct.

24 Q And you included everything relevant here,
25 to this rulemaking, based on your experience in

1 education?

2 A I did.

3 Q Including all the work and papers you've
4 done? Everything would be relevant, you've included
5 on this CV?

6 A I believe so. There could be a few papers I
7 don't have on there.

8 Q Okay. So skipping down to your testimony,
9 that I'm going to look at line -- Page 2, here. This
10 caught my eye. I highlighted it already for you. You
11 state here, and I'll read it, "One of the primary
12 focus areas of our department, at Mines" -- and I
13 think you're referring to the University of Colorado
14 School of Mines; is that right?

15 A It's -- correction -- it's actually Colorado
16 School of Mines.

17 Q Sorry. Colorado --

18 A It's its own entity. And we -- I just
19 briefly refer to it as Mines.

20 Q Got it.

21 A But it's capitalized.

22 Q I'll follow your nomenclature, and refer to
23 it as Mines as well.

24 A Thank you.

25 Q "One of the primary focus areas of our

1 department at Mines considers PFAS compounds in the
2 environment, with a specific focus on the removal from
3 PFAS-containing waters"; did I read that correctly?

4 A That's correct.

5 Q What caught me -- what struck me in this
6 comment here, or your statement here was -- and in
7 reviewing your CV, I didn't see any work that you do
8 on PFAS, but your department does work on PFAS?

9 A My department does quite a bit of work on
10 PFAS. I do some things with microbes in PFAS.

11 Q Okay. But when I reviewed your papers in
12 your review, I didn't see anything was referencing any
13 work on PFAS in particular.

14 A We have not published anything yet.

15 Q Okay. So you are involved with your
16 department on PFAS research?

17 A Yes.

18 Q Okay. How long -- how -- when did you start
19 that work, in your department, on PFAS?

20 A I got really interested in this about five
21 years ago, and we've been slowly conducting work since
22 the pandemic.

23 Q What has been your area of interest? Where
24 have you been looking at it?

25 A I'm very interested in how -- I'm an

1 environmental microbiologist, and I'm interested in
2 how microbes metabolize or don't metabolize PFAS
3 compounds, PFAS, PFOA compounds.

4 Q Which compounds in particular have you been
5 looking at?

6 A Right now, we're thinking about AFFF, which
7 is a firefighting foam.

8 Q Do you -- have you looked at any other PFAS
9 compounds other than AFFF?

10 A You know, we've been looking at natural
11 waters that are contaminated with -- with these
12 compounds, and there are many compounds in those
13 waters. So what we're basically looking for is, is
14 there defluorination of carbon-fluorine bonds that
15 could be happening microbially.

16 Q Are you aware of AFFF being used in any oil
17 and gas operations?

18 A I'm not. But I also am not aware of all
19 compounds used in oil and gas operations.

20 Q Have you reviewed what oil and gas
21 operations have used for downhole operations,
22 hydraulic fracturing?

23 A Yes, somewhat.

24 Q Where have you reviewed that?

25 A I reviewed that in the document that came

1 out, that Dusty Horwitt's put out.

2 Q Okay. Is that the extent of your analysis
3 or --

4 A I also looked at FracFocus stuff.

5 Q Okay. So Dusty Horwitt's, that's Physicians
6 for Social Responsibility Report?

7 A That's correct.

8 Q The one that relates to New Mexico, or for
9 any of the other state reports?

10 A Both. Or several, actually.

11 Q Okay. And then in addition to that report,
12 you looked at some of the FracFocus disclosures?

13 A Yes.

14 Q Okay. Was that done in preparation for this
15 hearing?

16 A Part of it's done in preparation for my own
17 research.

18 Q Okay.

19 A Or our own research.

20 Q So you are -- are you aware of the two PFAS
21 compounds that the Physicians for Social
22 Responsibility identified or documented in the
23 downhole operations in New Mexico?

24 A Yes.

25 Q And those were the -- I'm just going to use

1 their acronyms -- PTFE?

2 A Correct.

3 Q And then one that we're calling FPEG. You
4 familiar with that definition, or that acronym? I'll
5 get -- you recognize that there are two compounds?

6 A I recognize there are two compounds. I've
7 not heard that particular acronym.

8 Q Okay. Do you know the -- I'll get to it in
9 a moment because I have it in my notes. I don't have
10 it right in front of me. Have you looked at those two
11 compounds, at all, in any of your research?

12 A We might have, but, like I said, we have
13 not -- we don't have full characterization of some of
14 the water samples we've worked with.

15 Q Okay. But as you sit here today, you're not
16 aware of whether you've looked at those two in your
17 research?

18 A When I -- in my own research, when I look at
19 contaminated waters, I think of them as, like, a
20 minestrone soup with lots of compounds and
21 ingredients. And it's hard to know all of them.

22 Q Okay. Now, but sitting here today, you're
23 not aware or you can't state for certain that you
24 did -- you have evaluated those two specific compounds
25 that were identified in the PSR report?

1 A Not in waters that I've looked at from
2 Colorado.

3 Q Okay. And have you looked at any waters in
4 New Mexico?

5 A I have not.

6 Q Okay. Interested in this next comment here,
7 that I've also highlighted. I think this goes
8 to -- just want to kind of, you know, narrow the scope
9 of our discussion today. You mentioned these, and
10 I'll refer to them here. This is Page 3 of your text
11 testimony.

12 "The PFOS and PFOA compounds, the forever
13 chemicals, can now be found in many surface and
14 groundwaters in my state of Colorado, New Mexico, and
15 across the country"; Did I read that correctly?

16 A You did. I'd also like to clarify the last
17 comment.

18 Q Sure.

19 A Well, if I looked at any waters in New
20 Mexico, I have not, for PFAS compounds. But I've
21 looked at a number of waters related to caves that are
22 in Southeast New Mexico for the geochemical components
23 that comprise those waters.

24 As far as this comment right now, "can be
25 found in many surface and groundwaters," I've really

1 relied on a -- a paper that has come out of New Mexico
2 State in Las Cruces, New Mexico. The corresponding
3 author is Pei Xu. It was published in 2022. It has a
4 comprehensive list of, I think, 56 PFAS/PFOA compounds
5 in there, as well as the geochemical characterization
6 of the metals in the waters.

7 And that paper is very well done, in my
8 opinion, and it has a lot of great information that
9 I've relied upon for how I prepared this testimony.

10 Q Okay. So we, kind of, covered this, but I
11 want to make sure I understand correctly. The PFAS,
12 PFOS and PFOA compounds, to your knowledge, those have
13 not been documented in use -- in oil and gas uses in
14 New Mexico?

15 A They've been documented in subsurface ground
16 waters, many of them. I -- I'd have to look at the
17 paper. I don't have it in front of me, but it's
18 something, like, between one and two dozen of those
19 compounds have been characterized.

20 They looked at over 50, but between one and
21 two dozen were popping up in produced waters from the
22 state of New Mexico.

23 Q What study is that?

24 A That's what I just referenced. The
25 corresponding author is Pei Xu. Her first name is

1 P-E-I. Her last name is X-U. She's at New Mexico
2 State in Las Cruces. She is not the lead author;
3 she's the corresponding author. It's listed in my
4 references.

5 Q Okay.

6 A And that paper contains a lot of good
7 information.

8 Q Okay. So on the question of -- now, but
9 just to be clear, in the Physicians for Social
10 Responsibility you and I just discussed, that report
11 on New Mexico, it did not identify PFOS or PFOA
12 compounds as being used in completions in New Mexico;
13 correct?

14 A It did not, but I -- it may possibly have
15 not been aware of that paper.

16 Q Okay. But that report was based on what was
17 actually used downhole; correct? The PSR report?

18 A As far as the authors could determine, yes.

19 Q Okay.

20 A They -- can I expand on that?

21 Q Sure.

22 A They compared several surface waters,
23 looking at, potentially, like, man-made contributions
24 to surface waters that are found in most surface
25 waters in the US right now from all the products that

1 contain these compounds.

2 And they were able to show characterization
3 of surface water that was different than that of the
4 produced waters, suggesting that there are two
5 different sources of the compounds. There's a -- a
6 surface-human component and there is a -- another
7 subsurface human component, but they are different.

8 Q Yeah. That makes this whole process
9 complicated, doesn't it, trying to figure out the
10 sources of these complex compounds?

11 A So source tracking is a -- an important
12 thing to always consider. Yes.

13 Q On the issue of PFOS and PFOA, are you
14 familiar with the chemical properties of those
15 compounds, and how that might be useful or
16 advantageous, or used in oil and gas, if they were to
17 be used in oil and gas? I mean, why would those
18 compounds be used, if that's the potential allegation
19 I understand you may be making, that may -- they may
20 be actually be being used in oil and gas?

21 A I'm familiar with some of their
22 applications, but by no means all.

23 Q Okay.

24 A I know that they are used -- there's a
25 compound -- when you're putting drill pipe in the

1 ground, you're trying to lubricate the joints, the
2 threads, the female and the male parts, and you'll put
3 a goop on there. Some people call it pipe dope and
4 things like that. What is in that? I do not know.

5 That could be a potential source of it;
6 right? You can also use these things for proppants to
7 pull rock chips up as you're cutting. You can -- you
8 know, as a foaming agent. You could use them for
9 various lubrications that might be needed, or
10 necessary, or required for downhole operations.

11 I can see -- I can foresee many uses of
12 them. I don't have oil and gas industry disclosure on
13 how they are used.

14 Q I guess, my question, though, is, as to PFOA
15 and PFOS, are you familiar with those specific
16 compounds and their properties, and whether or not
17 they would be useful in oil and gas?

18 A I'm familiar enough with their properties to
19 know that they would be useful for oil and gas.

20 Q Okay. And do you, in your opinion, based on
21 your understanding of those properties, it's possible
22 they're being used for oil and gas?

23 A They would be useful for oil and gas.

24 Q Okay. Now, you mentioned that there are
25 dozens of these PFOS and PFOA compounds. Is it your

1 understanding that, for example, PFOS has more than
2 one form?

3 A They both have multiple forms. There are
4 thousands of these compounds.

5 Q Now, I'm not referring to PFAS, generally.
6 I'm referring to specific compound, PFOS. Is your
7 understanding that there's more than one -- that that
8 that specific compound takes more than one form?

9 A Yes.

10 Q Okay. And is that your understanding for
11 PFOA as well?

12 A Yes.

13 Q When you mentioned proppants, my
14 understanding in the oil and gas industry is proppants
15 are generally sand grains. Did do you understand that
16 PFAS or PFAS compound would function as a proppant
17 itself?

18 A I'm using the word proppant as something
19 that makes something float, or makes something be
20 suspended. Sand tends to sink.

21 Q Okay. So different use of the term that
22 you're using; yeah?

23 A Yeah.

24 Q Okay. So on PFOA PF -- your understanding
25 is PFOA also has multiple forms? It's not just a

1 single chemical structure?

2 A Correct.

3 Q Okay. On -- further into your testimony
4 here, I'm going to scroll down to Page 4. Let's see
5 if I got this right. Yeah. Okay. You state here,
6 "From my own published research into subsurface
7 microbial-influenced corrosion (MIC) of steel, I know
8 that subsurface separation of aquifers is near
9 impossible in the O&G industry" -- presumably oil and
10 gas industry -- "over longer timeframes (years)." And
11 then you cite to Wildlife Guardians Exhibit 83;
12 correct?

13 (WildEarth Guardians Exhibit 83 was
14 marked for identification.)

15 A That is correct.

16 Q Okay. That paper that -- you were a
17 co- author of that paper; correct?

18 A I am.

19 Q And as I understand, when I was reviewing
20 that paper, that the gist is that it was an analysis
21 of corrosive effects on three different types of steel
22 used for transporting and storing fuel-grade ethanol?

23 A That's correct.

24 Q Okay. And I was looking through that paper,
25 trying to understand the support for the

1 assessment -- assertion that subsurface separation of
2 aquifers is not -- is near impossible in oil and gas
3 industries.

4 That that paper was a laboratory test of
5 three different types of steel. The steel that you
6 tested in that experiment, of that paper,
7 that -- those were pipeline steels; right? For
8 transmission lines?

9 A Part transmission lines, but the same steel
10 as those three steels. The reason why we chose them
11 is they're used for multiple purpose -- purposes,
12 transmission pipelines being one of them. They can
13 also be used in a variety of downhole applications
14 from a drinking water well to an oil well.

15 Q So you're telling me that the specific
16 steel, the API X70, the API 5LX52, and the ASTM A36
17 steel are used in downhole operations?

18 A I do not know, but I would assume so because
19 they're common steels.

20 Q Okay. So you don't know whether or not
21 they're actually used for downhole operations?

22 A I have not seen the oil and gas disclosure
23 of the kinds of steel that they use.

24 Q Okay. Would it surprise you that -- because
25 they're downhole, and maybe two miles down, they have

1 different specifications for those operations?

2 A Potentially.

3 Q Okay. But you didn't check that yourself?

4 A We weren't doing oil and gas pipeline
5 specific to -- or -- or downhole steel specifically
6 for this study.

7 Q Right. So when I reviewed all your
8 references in that paper, in fact, they're all related
9 to transmission line steel?

10 A Uh-huh.

11 Q Okay. So you haven't done a test of
12 this -- similar test on any steel that's specifically
13 used for downhole operations? For drilling, tubing,
14 or casing steel?

15 A Oil and gas has not disclose what they've
16 used, at least that I've found. So we could have done
17 this, and we don't know.

18 Q Okay. Well, I just did a quick search last
19 night because I was curious, and you can -- it's not
20 hard to find. There's a bunch of websites that show
21 the different types of steel and grades, and
22 it's -- they're different.

23 A Correct.

24 Q Okay.

25 A There are many different kinds of steels.

1 Q So this paper that you referenced, it
2 doesn't, in fact, reference, or come to any
3 conclusions about downhole effects -- that there's no
4 conclusion about separation of aquifers referenced in
5 that paper; correct?

6 A We weren't trying to do that. The goal of
7 this paper that was published in Corrosion Science was
8 to show how microbes can degrade three different kinds
9 of steel.

10 Q Okay.

11 A We're trying to figure out and show does
12 steel get weakened by microbial metabolism, microbes
13 that eat it. That's why it's called microbial-
14 influenced corrosion. And we were able to show that.
15 That was the goal of the paper.

16 Q For those three types of steel; correct?

17 A Those three testing steels. And those three
18 testing steels were chosen because they're pretty
19 common as steels.

20 Q Okay.

21 A And they're not alone in the -- in the
22 corrosion of the steel.

23 Q But just to be clear, that paper does not
24 reference or provides direct support for your
25 statement that subsurface separation of aquifers is

1 impacted by microbial corrosion?

2 A I think what I meant by that statement is I
3 know how steel rots, and I worry about linking Point A
4 to Point B with a piece of steel.

5 Q Okay. So it's a concern of yours, based on
6 your general knowledge about corrosion and steel, but
7 it doesn't specifically support that statement;
8 agreed?

9 A That's correct.

10 Q Okay.

11 A Have you ever been on a drill pad to see how
12 steel rots or what it looks like when it comes out of
13 the ground?

14 Q I have seen some very old steel pipe in the
15 industry. I have. Yeah. So on that paper that you
16 referenced before, I believe it's your Wildlife
17 Guardians Exhibit 88; is that correct? That's
18 the -- oh, it's a different paper. I think that's the
19 Jiang paper. Is that the same paper you were
20 referencing with Pae --

21 (WildEarth Guardians Exhibit 88 was
22 marked for identification.)

23 A I think so. Could you scroll down to the
24 references just to confirm that?

25 Q Yeah. Let me double check for you. I think

1 it was this one?

2 A That's it.

3 Q Okay.

4 A Correct.

5 Q All right. Did you actually read -- did
6 you -- you read that paper; right?

7 A A couple of times.

8 Q Okay. And have you reviewed the laboratory
9 results that were published in that paper?

10 A Define how you mean by "review?"

11 Q Well, I mean, did you carefully look at any
12 qualifications or notations that went along with the
13 laboratory results that were provided in that paper?

14 A I read the whole paper, and believed that it
15 is good work.

16 Q Okay. But I'm asking you specifically about
17 the laboratory results that were published. Did you
18 specifically -- are you familiar with any of the
19 conditions or notations that went along with the
20 laboratory results?

21 A I'm familiar with all of those notations.

22 Q Okay. Do you recall what they were?

23 A I'd have to look at the paper directly.

24 Q Okay. And you -- so you don't recall, off
25 the top of your head, whether or not those lab results

1 were qualified in any way?

2 A They are qualified.

3 Q How are they qualified?

4 A They've got statistics applied to them.

5 They were done on the state of art best

6 instrumentation for all analytes, geochemically, as

7 well as PFAS/PFOA compounds.

8 Q So your recollection is that those lab
9 results identifying the PFAS compounds that we talked
10 about earlier are valid and correct findings?

11 A Very much so.

12 Q Okay. I'm scrolling back up into your
13 testimony. Let's see. I think it's Line 13. Okay.
14 Just a question here. I wasn't sure where you got
15 this value. So in Page 15, Lines 13 to 16, you
16 reference about a number, at least 1,600 other
17 chemical compounds associated with fracking fluids?

18 A Uh-huh.

19 Q Where did that 1,600 figure come from?

20 A I probably should have referenced that. I
21 think it came from the Horwitt study.

22 Q Okay. That -- because you've only ever
23 reviewed some of the fracking disclosures in New
24 Mexico, and the Horwitt study, those are the only two
25 possible sources; correct?

1 A For that particular number, probably so.

2 Q Okay. On the -- on this -- one last thing I
3 was, kind of, interested in this. Let me ask you
4 this. So the work you've been doing on PFAS, your
5 interest came up about five years ago; right? So you
6 started looking at particularly the AFFF foam; right?

7 A Uh-huh.

8 Q Have you done any field work yet? Have you
9 done any -- have you gotten any data on your research,
10 on your assessment of how AFFF foam degrades in the
11 environment?

12 A We don't have much data at this point.
13 We're relying on datas that are coming from -- or data
14 streams that are coming out of other labs.

15 Q Okay. So you haven't done any direct work
16 yourself yet on it; right?

17 A We've done direct work with growing microbes
18 in cultivation that have contaminated waters as their
19 growth medium.

20 Q And have you evaluated -- have you
21 been -- have you evaluated yet any response to
22 microbes or micro --

23 A We have not.

24 Q Okay.

25 A I mean, we know what the microbes are doing.

1 We know what they look like. We don't know how
2 much -- or -- or if, or how much compound they're
3 breaking down in those waters.

4 Q Okay. And the -- sorry, and the PFAS you've
5 been looking at has been limited solely to the AFFF;
6 right?

7 A Well, no. We're using naturally
8 contaminated waters that have many things in them. We
9 know that, and those are characterized in an adjacent
10 lab. So we know that there are many compounds that
11 are potentially in these. Like I said, think about it
12 as a -- as a complex soup.

13 Q Okay. So the -- but to date, you haven't
14 yet got any data back on how those -- whether or
15 not -- to what extent microbes are breaking down those
16 PFAS compounds in either the natural waters or the
17 AFFF foam directly?

18 A Out of my own lab, no.

19 Q Okay. The waters that you've got -- the
20 natural waters that you've collected, where are those
21 from?

22 A Mostly sites in Colorado.

23 Q Colorado. Right.

24 A Peterson Air Force Base, for example.

25 Q And do you know whether or not those waters

1 contain PFAS, at this point, that you've collected?

2 A Oh. We know. Yeah.

3 Q Okay. But you do you know what --

4 A We actually know most of them, that -- that
5 can be characterized by the current state-of-the-art
6 technology. Having said that, there are a lot of
7 things that are uncharacterized at this point, because
8 we don't know.

9 Q Why are they uncharacterized?

10 A So for -- the instrument provides a data
11 stream that can be referenced to known compounds. But
12 then you see other points in that data stream that are
13 unknown. That's what I mean by that.

14 Q Yeah. In other words are -- do we not yet
15 have analytical methods to detect all varieties of
16 PFAS?

17 A So given the complex nature of PFOS and PFOA
18 compounds, I don't think we have -- I don't think
19 every one of them has been characterized, because
20 there are so many of them.

21 Q And beyond that, we don't yet have
22 methodologies to identify them; correct?

23 A We have methodologies to identify hundreds
24 if not low thousands of them.

25 Q Okay.

1 A But not high thousands of them.

2 Q Okay. On the topic that you and I were
3 discussing earlier, the two compounds that Physicians
4 for Social Responsibility identified, you and I agreed
5 that there's one, which is PTFE, which is, I think,
6 commonly referred to as Teflon; right?

7 A That's correct.

8 Q Okay. And the other one doesn't yet have a
9 common acronym, but I believe it's called fluoroalkyl
10 alcohol substituted polyethylene glycol. Does that
11 sound familiar to you?

12 A It does sound familiar. I'm trying to think
13 of what the acronym was I've seen for that, the common
14 acronym.

15 Q So NMOGA, in its filings, has referred to it
16 as FPEG?

17 A FPEG. Okay. Got you.

18 Q Okay. You agree with me that that's the
19 other compound that --

20 A Yes.

21 Q -- PSR had identified? Okay. Now, in your
22 natural waters that you've collected in Colorado,
23 are -- do you know whether or not those natural waters
24 have been -- you have found PTFE in those natural
25 waters?

1 A To my knowledge, they have been -- both
2 those compounds have been found in different waters.
3 So when I say natural water, I'm not talking about
4 pure water. I'm talking about a river that's flowing
5 through a surface that's got people living around it,
6 upstream or downstream. That's what I mean by natural
7 water.

8 Q Right. So you have found PTFE in that
9 water?

10 A Yes.

11 Q And an FPEG?

12 A Yes.

13 Q Okay. But your studies, so far, have not
14 determine whether or not microbes are capable of
15 breaking those down; correct?

16 A Right now, people wonder how much microbes
17 can break any of this down, because these compounds
18 are still new, and evolution needs to happen for
19 microbes to break them down.

20 Q All right. Now, do you know, on the PFOS
21 and PFOA I was asking you about, whether you're
22 familiar with how their characteristics would be
23 useful for oil and gas. Now, do you know what other
24 industries or consumer products might make use of
25 those compounds? Are you familiar with any other uses

1 for those specific PFAS compounds?

2 A For those two specific ones?

3 Q Uh-huh.

4 A I don't know if they're in -- in our pizza
5 boxes or not. Because nobody's ever characterized the
6 full extent of those compounds in most environments.
7 I mean, they're on pillowcases, they're in sheets,
8 they're in clothing, they're in the lining of pizza
9 boxes. They're on your hamburger wrapper.

10 Q I've heard people use the word "ubiquitous."
11 Do you agree?

12 A Ubiquitous?

13 Q Ubiquitous.

14 A Yeah. That's a bad word to be using for
15 these compounds. I mean, in that it's true, they are
16 ubiquitous, but the worry is large.

17 Q Yeah. On that point, I want to just talk
18 with you about this analogy that you used in your
19 testimony that the -- the analogy, I think, here is
20 if -- so trying to explain the impact, potentially, of
21 introducing these compounds into the environment
22 is -- and the analogy you use is if you were to inject
23 your thigh with mayonnaise, and it's unknown how your
24 body would handle that mayonnaise outside of
25 its -- the places you would expect it to be; right, in

1 your digestive system, where you know it's going to be
2 handled appropriately. But in your thigh, you don't
3 know; right?

4 A Correct.

5 Q That's, kind of, the point. And the point
6 that I think that you're making in this analogy here
7 is on Page 8 of your testimony, from Lines 5 to 15, is
8 that it's unclear; right, what's going to happen with
9 this PFAS in the environment; correct?

10 A That is correct.

11 Q Okay. And you conclude the analogy with the
12 statement that -- find where it is. It's the last
13 line here -- last two lines, 14 and 15, that "We could
14 very well be killing the subsurface organism," meaning
15 the microbes; right? -- "that we depend on, with too
16 many mayonnaise injections. And as a subsurface
17 microbiologist, that scares me"; correct?

18 A That's what I'm referring to.

19 Q Yeah.

20 A I -- I view the whole subsurface as a living
21 thing up to a certain temperature point. We know that
22 microbes live up to 120 degrees Celsius. The
23 theoretical upper temperature limit for life is
24 probably 150 degrees Celsius.

25 So up until at least 120, you can think

1 about a rich subsurface life down there, and I worry
2 what we're doing to it. We don't even understand it
3 and we're giving it all kinds of "mayonnaise."

4 Q Right. I guess that's my point is -- to
5 this point, you don't have any results or data to
6 substantiate that concern; correct?

7 A I know that there's enough information out
8 there in subsurface microbiology literature that there
9 is concern for any compound that goes down a hole.
10 And there is concern for gasoline spills coming from
11 underground storage tanks.

12 Q Okay.

13 A You know, yeah.

14 MR. RANKIN: Thank you, Professor
15 Spear.

16 No further questions, Madam Hearing
17 Officer.

18 HEARING OFFICER: All right, thank you
19 very much Mr. Rankin.

20 Mr. Maxwell, do you have questions of
21 Dr. Spear?

22 DR. SPEAR: Your Honor, I do not have
23 questions for the doctor. Thank you.

24 HEARING OFFICER: Thank you very much.
25 Mr. Tremaine?

1 MR. TREMAINE: Yes. I have -- Madam
2 Hearing Examiner, I do have a few questions. Thank
3 you.

4 CROSS-EXAMINATION

5 BY MR. TREMAINE:

6 Q Good morning, Professor Spear.

7 A Good morning.

8 Q I have a -- first, I just have a
9 clarification question. I think we all know what you
10 mean, but in your testimony you used the phrase
11 regarding PFAS, "recalcitrance in the environment."

12 A Yeah. Can we back up a sec? Who are you?

13 Q Oh. Thank you. I'm Jesse Tremaine. I'm
14 the counsel for the Oil Conservation Division.

15 A Thank you. Sorry. I had to ask.

16 Q That's quite all right.

17 A What I mean by recalcitrance?

18 Q Yes.

19 A Recalcitrance is a word that we use in
20 environmental engineering and environmental chemistry
21 for any compound that tends to linger in an
22 environment, and/or is hard to go away, or hard to
23 decay. It's used a number of ways. You could say
24 that the furniture in your house is recalcitrant,
25 because you wanted to be there, and it's there.

1 Q In reviewing the testimony of the other
2 witnesses to this hearing, would you -- I believe it's
3 been referred to as PFAS are stable in the
4 environment. Would you agree with that as well? Is
5 that a synonym?

6 A That's by design. Those compounds are meant
7 to be stable in the environment so that they can
8 provide the property that they do for the lifespan or
9 lifetime of that molecule, with a high recalcitrance.

10 Q Thank you. I want to ask you just a couple
11 clarifying questions about a phrase that you used in
12 your testimony. I believe that you used the phrase
13 under the precautionary principle, that we should ban
14 known harmful substances; is that true?

15 A I basically used it in a -- I don't know if
16 those exact words, but yes, I think that cautionary
17 principle applies, particularly to things that we
18 don't understand. How do we take care of something
19 that we don't understand? And that's what I mean by
20 that.

21 Q Okay. So just to clarify, on Line 8, on
22 Page 5 of your testimony, WildEarth Guardians
23 Exhibit 79, it states, "The precautionary principle
24 dictates that we should ban known harmful substances,
25 and at least know what is being used in oil and gas

1 production"; is that accurate?

2 A It is. And I completely agree with that
3 statement.

4 Q Thank you. I just want to explore the full
5 extent of that statement. So I think it's fair to say
6 that in the context of this testimony, you are
7 applying that to PFAS compounds; is that fair?

8 A That is fair.

9 Q Okay. I'm not trying to mischaracterize
10 your testimony, but I think that that's a pretty broad
11 statement. So I'm trying to get your feedback on,
12 like, how far that applies. When you make that
13 statement in your testimony, are you applying that
14 precautionary principle or that statement to any other
15 compounds other than PFAS?

16 A So it is a broad statement in the context
17 that I'm trying to be broad, because of the extent of
18 this potential problem. And I'm sorry; I missed the
19 second part of your question.

20 Q I'll get in -- so how do you, -- I'll
21 rephrase the second part of my question. How do you
22 define, in your professional opinion, harmful
23 substances?

24 A I define harmful substances as something
25 that causes harm to a living thing. And that would be

1 a -- could be a human body, it could be you or I; it
2 could be something that changes the microbial
3 community of your mouth. It could be something that
4 changes the microbial community of near-surface, like
5 soil.

6 It could be something that changes the
7 microbial community of a deeper environment, like a
8 deep subsurface. So it's something that causes harm,
9 or it causes a drastic shift.

10 Q Okay. All right. So is it fair to say, I
11 mean, you are applying that in terms of both human
12 health and environmental health?

13 A Here, I'm applying to environmental health.
14 This statement applies to environmental health,
15 because that's what I do is environmental
16 microbiology. But the environmental microbiology that
17 I do often transfers to the human body. I just don't
18 work on the human body too much.

19 Q Thank you. Thank you for that
20 clarification. I'll focus on the environment. So I
21 understand the purpose of -- or the point of your
22 testimony to be essentially the statement that The
23 Commission should ban, as you say, all known harmful
24 substances from injection underground; is that true?

25 A It is. And what I'm asking, or what I'm

1 thinking of there is, I think it's not just PFAS/PFOA
2 compounds. I think we need more data to understand
3 what's going down the hole. We need to understand
4 what is potentially migrating in the subsurface. I
5 want -- I would -- I -- it would be great for future
6 generations to understand what went down a hole today,
7 because some of these compounds are going to be around
8 for decades or centuries.

9 Q Thank you. I want to split off the -- your
10 statement about acquiring data, because that's a
11 different question from the policy statement of
12 banning or prohibiting use of substances. And I want
13 focus on that part of it and, kind of, just clarify
14 how far that goes.

15 So would you agree that, depending on the
16 situation, injecting large amounts water downhole
17 could be damaging to an environment?

18 A Depends on what's in the water.

19 Q Okay. So that's a yes, it depends?

20 A Define "water"?

21 Q Okay. How about sand? If we inject sand
22 into a subterranean environment, could that be
23 damaging to the subterranean environment or the
24 environment generally?

25 A Potentially, because that sand could contain

1 its own microbiome.

2 Q Okay.

3 A And you're injecting a new microbiome down
4 into a new place, that could alter the microbiome that
5 already exists there.

6 Q Okay. Guar gum, mineral oil, or crude oil,
7 any of those examples, if those are injected downhole,
8 those could all cause damage to the subterranean
9 environment; correct?

10 A Guar gum -- when I hear those terms, guar
11 gum, xanthan gum, crude oil, I think about what they
12 are. They all contain carbon, and carbon is food, and
13 it's required for life. So subsurface microbes are
14 going to probably have a chow-down on the guar gum,
15 for example.

16 Q Okay. How about produced water, injecting
17 produced water downhole? As it's commonly understood,
18 once it's separated from crude and natural gas, if you
19 inject produced water downhole, could that cause
20 environmental or subterranean damage?

21 A I think if it was injected into the
22 environment that it did not come from, you're going to
23 alter that environment.

24 Q So, Professor Spear, where do we draw the
25 line, then? I mean, I -- here, we're talking about

1 PFAS. There are -- would you agree that it is fair to
2 say that the substances we're talking about exist on a
3 spectrum of greater to lesser potential harm?

4 A That's probably a fair description of the
5 spectrum.

6 Q Okay. So I'm talking -- I'm asking you
7 about examples of things that are commonly used in
8 injury -- in industry, and that are perceived by many
9 to be less injurious to human health and the
10 environment.

11 And so I want to elicit your opinion, for
12 The Commission, on where on that spectrum we draw the
13 line for what's appropriate to inject downhole?

14 A Good question. I think if we look at the,
15 the surface limits for water, 4 parts per trillion is
16 the standard for these compounds. Four
17 parts -- 4 PPT. Some of these environments that are
18 coming up from subsurface produced waters have that,
19 or more.

20 So you can think about having 4 PPT flowing
21 by in a river, or a creek, and a city is taking from
22 that. You can think about that as, okay, that's
23 a -- kind of, a two dimensional problem. There's
24 river flowing through a town that the town is using
25 for water, and it contains 4 PPT.

1 If you think about a subsurface groundwater
2 aquifer, or even a deeper produced water aquifer, if
3 that's containing -- you've got things in three
4 dimensions, so that's 4 PPT times a much bigger
5 volume. That's going to require a much different way
6 of removal.

7 Q So am I understanding your testimony,
8 Professor Spear, to agree with the idea that
9 quantification of the contaminant is important?

10 A It would be important from a science
11 perspective to better understand what's going on in
12 the subsurface.

13 Q Okay. I want to move on, and ask you a
14 couple of general questions about the karst section of
15 your testimony, as that is a concern, I think,
16 everyone knows, for the Oil Conservation Division.
17 And I want to make sure I understand that section.

18 Could you, please, very briefly, like,
19 summarize your concerns with spills in the context of
20 karst?

21 A So summarize. I am a person who's a caver.
22 I've been caving for 40 years. I've spent almost as
23 many days underneath New Mexico as I have on the
24 surface of New Mexico. I've been in a lot of caves
25 down in the southeast area, around -- in and around

1 Carlsbad.

2 I understand karst from a recreational
3 caving perspective, from a geochemical perspective,
4 and somewhat, from a microbiological perspective.
5 Caves and karst in southeast New Mexico form or
6 thought to form by a hypogenic effect.

7 Hypogenic caves are caves where sulfides are
8 coming out of the Permian Basin. Those sulfides form
9 sulfuric acid. Sulfuric acid dissolves the limestone,
10 which then makes formations inside that would
11 make -- that makes things like the Great Room of
12 Carlsbad, where I hope you've been, because that place
13 is amazing.

14 The -- the formations you see underground
15 are -- are really something that the caves of New
16 Mexico are special, because they probably were -- not
17 probably -- they were formed with a big sulfide,
18 sulfur component, which probably came off the -- the
19 western edge of the Permian Basin.

20 So what you need to think about for cave, is
21 if you have a -- a dish sponge next to your sink in
22 your kitchen, and the one that's next to my sink in
23 the kitchen has a green nylon top that's a scrubby.
24 It's a Scotch-Brite. And underneath that, there's a
25 sponge that's yellow.

1 I think of a cave as very much that -- not a
2 cave, but I think about karst that way. It's got a
3 green layer on top. That's the forest and the soil.
4 And then it's got rock underneath, which is the yellow
5 part of the sponge.

6 And all those holes in the sponge are very
7 linked, and they're very porous, and things flow
8 through those sponges. If I -- if I dripped red food
9 coloring on one corner of the sponge, you would see
10 how it's on the other corner of the sponge in short
11 order, because it's going to migrate right through the
12 sponge.

13 You guys have probably seen this when you
14 pick up spaghetti sauce on the counter; right? And
15 karst is very much that way. So geochemically,
16 microbiologically, geologically, karst is a very
17 special environment.

18 I worry about oil and gas operations
19 penetrating karst, because if you penetrate a
20 subsurface void, you can try to fill it, for example,
21 but then you're going to change that environment. So
22 that's the thing.

23 And I think the takeaway from that whole
24 point I just brought up, is karst is critical for how
25 humans use water. It's somewhat of a -- a near

1 subsurface aquifer cleansing agent. The microbes that
2 live in the karst will be scrubbing those waters for
3 what's in them.

4 And you need to, I guess, the -- the term
5 I'm looking for is I view wetlands on the surface
6 around rivers and lakes as an environmental liver.
7 They're metabolizing the compounds in those waters to
8 be a better water. Karst does the exact same thing.

9 If you're ever in Bowling Green, Kentucky,
10 which is where the Chevrolet Corvette car is made,
11 Bowling Green's waters all rely on karst. So karst is
12 a valuable resource that should be better considered
13 for the importance that it has. Sorry for the long
14 winded answer.

15 Q I asked you for a summary. That's on me.
16 But thank you for that answer. It does help me
17 understand that section of your testimony. My reading
18 of your testimony in this section is identifying an
19 area of possible concern, but it does not include any
20 documentation of specific effects of releases, or
21 PFAS, particularly on karst; is that correct?

22 A That's because there's not much
23 documentation.

24 Q Okay.

25 A There is some, from, for example, the -- I

1 think Pei Xu's paper has water information from the
2 Pecos -- the Pecos River, which is flowing on top of a
3 karst. So those two things are linked.

4 Q Are you aware that the Oil Conservation
5 Division has a specific -- a karst-specific release
6 policy?

7 A They do. Yes.

8 Q Aside from the paper that you mentioned, are
9 you aware of any other -- any published research or
10 data related to PFAS -- I want to use the word
11 profusion. That's probably incorrect, but like,
12 moving through karst.

13 A I like word "profusion," because that's
14 what's happening. No. I am not. This is something
15 that we've been wanting to look at. Colorado School
16 of Mine's instrumentation's pretty booked, on worried
17 about -- worrying about surface waters.

18 And those machines run 24/7, 365. And karst
19 waters, I have not been able to process them through
20 there. But I would like to.

21 Q Okay. Just want to clarify, for the record,
22 the pathway that you're describing. And as I
23 understand it, what you're describing is concerns
24 related to surface releases of largely, produced water
25 that may or may not contain PFAS; is that correct?

1 A Yes. So I've seen a talk -- there's
2 actually something called the International Society
3 for Subsurface Microbiology, ISSM. There was a
4 meeting last year; it was in Banff Alberta. And there
5 was a talk that was presented there that showed
6 surface releases of things coming out of trucks
7 disposed -- dispensed of right on the ground in
8 southeast New Mexico and around Carlsbad.

9 You have no idea what was in those waters,
10 but I could assume that it's a complex minestrone of
11 many compounds that are being surface-discharged,
12 which are then going into surface waters. They could
13 come into the form of -- you know, down there around
14 Carlsbad you have little creeks, and ravines, and
15 streams that are -- only flow when there's a major
16 thunderstorm. And that -- that's when those compounds
17 would go mobile.

18 Q Well, the Division definitely agrees with a
19 general concern on illegal dumping. I'd like to ask a
20 few questions about your well failure and separation
21 of -- or segregation of aquifers that you were talking
22 with Mr. Rankin about on Page 4 of your testimony.

23 Are you aware that, in certain -- or many
24 circumstances, the Oil Conservation Division requires
25 performance of mechanical integrity tests on wells?

1 A Very much so. The engineering and design of
2 oil wells is one of the bigger, and better, and most
3 amazing feats of engineering that humans have ever
4 done.

5 Q And would you agree that in -- are you aware
6 that in certain cases -- in many cases wells pass
7 mechanical integrity tests after 50 years or more?

8 A Some do, and some don't. And not every one
9 is tested. I worry about abandoned wells. They'll
10 put a concrete plug in the top, and that casing, that
11 steel that's downhole becomes permeable. And then
12 you've got natural or manmade seismic activity that's
13 happening between now and 500 years from now, that's
14 going to crack, and move, and make things fail and
15 distribute.

16 I'm -- I'm thinking about things -- not on
17 a -- so much today scale as -- as years coming into
18 the future.

19 Q And to clarify, are you talking about wells
20 plugged in the past, or current well-plugging
21 standards?

22 A I would say both. I worry about when you
23 plug a well today, you're still going to potentially
24 have subsurface microbes chowing anything that's metal
25 down that hole, and by chowing, I mean consuming it.

1 And that's going to make that plug -- maybe
2 not permeable in the vertical direction, such as this
3 stuff comes up to the surface, like, oil or gas. But
4 it might make things more permeable for things that
5 are flowing through that needle that's dropped down
6 into this subsurface environment.

7 Q Uh-huh. Are you aware that the Oil
8 Conservation Division requires plugs between -- to
9 separate each strata, not simply at the top of the
10 well?

11 A That is correct. Are those plugs
12 sufficient, and enough? Have they been studied from a
13 microbial geochemical standpoint over time? I don't
14 know if they have.

15 Q Would you agree that, in terms of this
16 corrosion concern, that exposure to certain elements
17 may increase the corrosion and decrease the life of
18 the materials?

19 A Yes. I have that concern.

20 Q So for instance, exposure to H₂S could
21 increase corrosion?

22 A Sure.

23 Q Okay. So is it fair, then, to say that the
24 corrosion and life of the equipment depends
25 substantially on the specific environment in which the

1 equipment is used?

2 A Every environment is different. Every rock
3 strata is different. Wherever oil and gas is found,
4 it goes into different areas; that's ecosystem-
5 specific for where that particular location is. What
6 I mean by that is, like, Southeast New Mexico, for
7 example, Carlsbad area is not going to be analogous to
8 Pennsylvania, or to Alabama, or to Los Angeles,
9 because the rock type's different everywhere.

10 Q So in terms of gauging or establishing
11 requirements for materials used, and plugging
12 standards, et cetera, the Division has to -- you know,
13 Division staff have to incorporate information related
14 to multiple different variables that impact the life
15 of equipment and the well. I mean, is that -- you
16 would agree with that?

17 A Yeah. They do have to -- you know, they
18 require multiple variables be considered, but
19 certainly not all variables. Like, how many of them
20 think about actual subsurface microbiota?

21 Q Okay. So I think we agree that the testing
22 component of mechanical integrity tests are very
23 important; is that fair?

24 A I would say they're important. Are they
25 sufficient? I don't know the answer to that.

1 Q So I'm coming around to my points. Thank
2 you. Where -- exactly how does that, kind of, in your
3 opinion, does this calculus or requirements for well
4 equipment change, once you add PFAS to the mix?

5 A I don't think we know.

6 Q Okay. So you don't have, as you sit here
7 today, a specific proposal to change any mechanical
8 integrity tests, limits, or processes, or equipment
9 requirements, or anything like that? It seems like
10 it's a -- it's a really a recommendation to obtain
11 more information; is that fair?

12 A More information would be great. I could
13 envision, like, let's do an experiment to see how well
14 this particular system or subsystem in a downhole
15 environment works, and let's test it, and let's see
16 what happens. But we -- we need, like, declaration of
17 what is being used. It's hard to work when you're
18 blind.

19 MR. TREMAINE: I don't have any further
20 questions. Thank you, Professor.

21 HEARING OFFICER: All right. Thank
22 you, Mr. Tremaine.

23 I don't have a practice of asking for
24 appearances every day of a multi-day hearing. But let
25 me just confirm, because this is when I would be

1 calling on them to ask questions, whether there are
2 any representatives of New Energy Economy or EOG
3 present in the room, or on the platform?

4 My understanding is they're not with us
5 today, but we'll see them tomorrow.

6 All right.

7 MS. KESSLER: This is Jordan Kessler
8 with EOG, and I won't be having any questions today.

9 HEARING OFFICER: I didn't hear.
10 Sorry. Is that you, Jordan? Let's see here.

11 MS. KESSLER: Yes. Can you hear me,
12 Madam Hearing Examiner?

13 HEARING OFFICER: Now, I can. Yeah.
14 You were very soft.

15 MS. KESSLER: Thank you. Sorry about
16 that. This is Jordan Kessler on behalf of EOG
17 Resources, and I will not be having any questions
18 today.

19 HEARING OFFICER: Okay. Thank you very
20 much.

21 MS. KESSLER: Thank you.

22 HEARING OFFICER: Terrific.

23 Mr. Davis, do you have any follow up
24 with Dr. Spear?

25 MR. DAVIS: No redirect from me.

1 HEARING OFFICER: All right.

2 Commission, it's been 90 minutes since
3 we started. Would you like to ask your questions now
4 or take a break and come back?

5 MR. RAZATOS: Break, please.

6 HEARING OFFICER: All right. Let's
7 break to 10:15.

8 (Off the record.)

9 HEARING OFFICER: Let's come back from
10 the break, please. There we go. All right. When we
11 broke for a short break, the parties had finished
12 their questioning of Dr. Spear, and we turn now to The
13 Commission.

14 Mr. Chair, do you have questions of
15 Dr. Spear?

16 MR. RAZATOS: I actually do have.

17 CROSS-EXAMINATION

18 BY MR. RAZATOS:

19 Q Thank you for your testimony, Dr. Spear. I
20 appreciate you being here with us today. I do have
21 one question. Throughout your testimony with all of
22 the parties that you discussed, you keep bringing up
23 the Xu paper.

24 A Uh-huh.

25 Q That was done out of New Mexico state;

1 correct?

2 A Correct.

3 Q Okay. So I pulled up the Xu paper, real
4 quickly, because I honestly did not look at it until
5 right now. And I was looking under the
6 subheading -- under PFAS analysis, and they only
7 pulled out two samples. One was produced water, and
8 one was water from the Pecos River; does that sound
9 correct to you?

10 A I think -- I thought it was more than two
11 samples. I thought it was, like, twelve. But I could
12 be wrong.

13 Q And maybe there were, but okay, then two
14 sources?

15 A Two sources is --

16 Q Two sources -- better way to say it. Fair
17 enough?

18 A Fair.

19 Q In their actual analytical process -- and I
20 didn't see how they -- I can't tell how they analyzed
21 for PFAS. They didn't really break it out like they
22 did the other VOCs, and other compounds that they
23 found.

24 But they said that in total, 34 compounds
25 were analyzed in the study. Five were detected in the

1 produced water, and also ten compounds were detected
2 in the water from the river. I found it interesting
3 though, that the produced water also had the compounds
4 in the blanks. That's, kind of, problematic for any
5 analytical process.

6 I've -- I did forensics for 17 years and so
7 I understand that blanks should be blank. How, in
8 your mind, as a scientist, do you rectify that glitch?

9 A I would -- for me, I would rectify it by
10 retesting. Whether or not they did that or not, I
11 don't know. I also don't know how this study was
12 funded, or how much money they were able to throw at
13 testing.

14 These analyses are expensive, and not
15 everywhere -- not every place has the LCMSMS machines
16 to do it. And so I'd have to check that. But
17 that -- if I -- the blanks are positive, that's what I
18 recommend, is a redo.

19 Q Yeah. So I mean, we really can't put as
20 much basis on these results, because even the blanks
21 came out positive in this instance. Don't take me
22 wrong; --

23 A No, no --

24 Q -- I'm a full proponent that PFAS is
25 dangerous, but --

1 A No. I agree with you on that statement. My
2 point is, like, they were coming up in the -- the same
3 kinds of concentrations. So something could be funky.

4 Q Okay. Awesome. And then would you also
5 agree with this statement, which I actually did
6 appreciate. In the article it says that "It's also
7 important to elucidate the sources of PFAS in produced
8 water with the elimination of any potential cross-
9 contamination during transportation and pipelines,
10 trucking, storage sampling, or a legacy from the
11 source of water introduced into the formation during
12 the fracturing."

13 A They were obviously thinking about their
14 system, and where things can be introduced or not
15 introduced. And -- and then I think the point of what
16 I said earlier was, like, we need more data.

17 MR. RAZATOS: Sure. Okay. That was my
18 one question. Thank you.

19 Madam Hearing Officer, thank you.

20 HEARING OFFICER: Thank you.

21 Commissioner Bloom?

22 CROSS-EXAMINATION

23 BY MR. BLOOM:

24 Q Good morning, Dr. Spear. Thank you --

25 A Good morning.

1 Q -- for being here today. I'll look at you
2 and Mr. Davis here for some guidance, but one thing
3 we're going to need to get into are the proposed
4 changes to statute. And I don't know if you'd be the
5 person to talk about that with?

6 A I would not be the person to talk to about
7 specific proposed changes to statute. My underlying
8 thing is I would -- as a science human, I would like
9 more data.

10 Q Okay. Yeah. Because we do have a lot of
11 proposed changes to language here, including adding
12 the definition of chemical, chemical disclosure lists,
13 downhole operations, hydraulic fracturing treatment.
14 We need to get at the definition of PFAS chemicals
15 themselves.

16 I think we may have three differing
17 definitions between the proponents, OCD, and
18 NMOGA -- the Oil and Gas Association. We've got
19 definition of trade secrets, undisclosed chemicals,
20 well site, along with some other proposed changes to
21 language as well, which would affect policy. Maybe --

22 A Could I comment on that?

23 Q Fourteen, fifteen, sixteen, seventeen
24 changes there. And so we have to -- we need to have
25 those discussions, and I'm, kind of, digging for a way

1 to bring those up. Yes. Dr. Spear?

2 A Sorry to interrupt you with the comment
3 question. I think, if you like to cook, you have a
4 recipe, and you're going to make something delicious.
5 And it's important to know what's in that recipe. Do
6 you want salt instead of sugar in your brownies?

7 And my point is, in an environmental system,
8 I think the more knowledge we have for how we're
9 making the recipe to get a product out of the ground,
10 in this case, it's important to know what's in the
11 recipe.

12 And it's important to know the fate of where
13 those compounds might go with time, or how are they
14 going to be used, or how are they going to disappear,
15 or not. That's why I think it's important to think
16 about all these compounds that you just mentioned.

17 MR. BLOOM: Let me pause here for a
18 sec, and I'll look to our hearing officer here, who
19 probably has done more rule changes than any of this.

20 Any thoughts on an approach to how we
21 could get at the proposed changes in language
22 throughout our ranks here?

23 HEARING OFFICER: So usually, following
24 a complex rulemaking, and I would consider this a
25 complex rulemaking, because there are several parties

1 with different positions, I would invite the
2 parties -- unless you were inclined to deliberate
3 immediately, which I think is unlikely here -- I would
4 invite the parties to offer, in writing, their last
5 best final offer.

6 I think one of the Counsel, perhaps was
7 Mr. Tremaine, mentioned that, you know, there may well
8 be some movement. It won't be dramatic, presumably,
9 but some movement, even on the partys' side themselves
10 based on what they've heard here.

11 And so we choose a version of the rules
12 to use as the baseline, say, the rules as set out in
13 the petition. The other parties have already, kind
14 of, indicated what changes they would propose to be
15 made to the changes set out in the petition.

16 And then we would ask them for another
17 round of that, having heard all of the evidence and
18 all of the cross-examination.

19 Mr. Tremaine, do you have something to
20 offer?

21 MR. TREMAINE: I was -- I would only
22 offer The Commission that, having done this process
23 before, we submitted, for Mr. Powell's testimony, a
24 breakdown of section by section, comparing OCD's
25 proposal to WildEarth Guardians' proposal.

1 I do expect there will be lots of cross
2 back and forth on that topic. So we go through line
3 by line in that, and today after the
4 testimony -- after hearing the testimony yesterday, we
5 submitted a rebuttal notice related to -- also for
6 Mr. Powell.

7 And we submitted a second such set of
8 slides where we walk through, at least from the
9 division's perspective, the specific changes, section
10 by section, compared to the NMOGA's proposal. And
11 again, that will necessarily elicit, I'm sure, quite a
12 bit of cross.

13 So that does not answer Commissioner
14 Bloom's question in Guardians, during the hearing,
15 presenting, like, their version of that. But I think
16 we intend to elicit a lot of that discussion through
17 Mr. Powell's testimony, hopefully this afternoon.
18 We'll see.

19 HEARING OFFICER: Yeah. So
20 Commissioner Bloom, I hope we answered your question.
21 I mean, Guardians -- if we're going to, for example,
22 invite post-hearing submittals from the parties, and
23 again, I think that's likely, Guardians will have an
24 opportunity themselves, even if their witnesses have
25 already spoken, to offer up a final, last, you know,

1 kind of, best proposed rule.

2 And so long as that proposal is based
3 on the record that we made, then it's consistent with
4 the -- what do they call it -- logical outgrowth rule.
5 And everyone will have a chance to do that.

6 But do you have something to offer,
7 Mr. Davis?

8 MR. DAVIS: I do. Thank you, Madam
9 Hearing Officer.

10 I just wanted to say that we
11 also -- any questions that you have, Commissioner
12 Bloom, in that process, please just let us know to
13 make sure that we address your questions in a final
14 submission, and we are happy to do that.

15 MR. BLOOM: That is helpful and --

16 MR. DAVIS: Okay.

17 MR. BLOOM: And so you're talking
18 about -- is a, kind of, final best offer being the
19 written closings that we received from everybody.
20 Okay. That's helpful. And I really did appreciate
21 OCD's slides, and the side-by-side comparisons, and
22 that's actually really helpful.

23 And just wait to see everything
24 frankly, and get the conversation going. I don't think
25 we've seen your recent -- was it, rebuttal?

1 MR. DAVIS: I did not -- as a matter of
2 practice, and I can change this, I do not send it to
3 Commissioners. I sent it to Madam Hearing Examiner
4 and the law clerk, and the parties, and Counsel. So
5 it should be available for distribution. But it was
6 during the last testimony. You have not had any
7 opportunity to review it.

8 HEARING OFFICER: Yeah. It was sent
9 today, Commissioner Bloom, and so you should be
10 getting it from Sheila.

11 MR. BLOOM: Very good. Okay.

12 HEARING OFFICER: Oh. Sorry.

13 Ms. Mulcahy?

14 MS. MULCAHY: I apologize. I didn't
15 mean to interrupt Commissioner Bloom if he had
16 something more to say.

17 I don't -- I think perhaps what The
18 Commission is wondering about is, generally what
19 happens is that the petitioner usually goes through
20 each section of whatever it is that they're proposing,
21 and then provides witnesses or justifications
22 demonstrating how they have met their burden to show
23 why the changes should be made.

24 And I am not sure if that's happened
25 here. And perhaps maybe that's what's driving

1 Commissioner Bloom's question.

2 HEARING OFFICER: Ah. Did I
3 misunderstand your question, commissioner Bloom?

4 MR. BLOOM: No, but something along
5 those lines would be helpful as well. I think we can
6 get at that with the closing statements. This is
7 just, I think, a particularly complex rulemaking with
8 three parties, with three different sets of comments.

9 And we've tried to keep an abridged
10 format for timeliness, or, I guess, rather to save
11 time, but we're not having, sort of, the full flushing
12 out of the proposal and then other -- and then counter
13 proposals as well. So it's a little bit more
14 challenging. But, I mean, clearly we got our arms
15 around this. So I think this looks good.

16 So I will not pepper poor Dr. Spear
17 with 400 questions about varying definitions and small
18 changes or -- and/or large changes to the regulations
19 themselves. But it looks like Mr. Davis may have
20 something else on this. We can flush this out a
21 little bit more if we need to. And then I think I'll
22 just have one or two questions for Dr. Spear.

23 MR. DAVIS: Yeah. I just wanted to
24 briefly respond and say that I agree with Ms. Mulcahy
25 that Guardians has not provided the specific basis for

1 our rule yet, because we're waiting to see what comes
2 into evidence.

3 And once it comes into evidence, we put
4 that together with you -- put that together for you,
5 for your consideration. So I agree with Ms. Mulcahy
6 that we have not done that yet, because I did not want
7 to put that together for The Commission based on facts
8 that may or may not be admitted to the record.

9 And so again, we're happy to do that,
10 and we're planning to do that, and address all your
11 questions. So if you can give us direction in that
12 process, we're happy to take that direction.

13 HEARING OFFICER: Let me offer one
14 other observation, Commissioner Bloom. Even though
15 Guardians is the petitioner here, it really
16 would -- the -- I think the testimony you're most
17 likely to get that answers the questions bubbling for
18 you is going to come from the Division, because the
19 Division is going to have their arms around every part
20 of the regulatory scheme, just by virtue of their
21 jobs; right, of their mission and their work in this
22 regulatory context.

23 So I think you're going to be able to
24 get --

25 Without putting too much pressure on

1 you, Mr. Powell --

2 I think you'll be able to get a lot of
3 what you're looking for from the regulators, in terms
4 of how this petition would change the way they already
5 behave.

6 MR. BLOOM: Great. That's really what
7 I needed, was a path forward on that. So yeah. Thank
8 you. I think we've found one. Okay. Give me a
9 minute here and let me just pull up my questions, then
10 we'll get started again.

11 BY MR. BLOOM:

12 Q Mr. Spear, any thoughts about the -- and you
13 may have gotten at this already with your previous
14 reply to me, but another opportunity for you. Any
15 thoughts on which definition of PFAS we should use and
16 why?

17 A Great question. This is a -- I'm trying to
18 find my words. This is a category or a
19 classification, a chemical compound that's manmade.
20 There are tens of thousands of those compounds. You
21 could regulate, one. Like, 3M had Scotchgard for
22 waterproofing fabric. That's -- that's great. And
23 they said this is not good 'cause it's going
24 everywhere.

25 People are breathing it. It's -- you know,

1 everything. You can imagine aerosolizing that, and
2 spraying it on a jacket; right? 3M turned around,
3 made a new reformulation Scotchgard. Reformulation
4 did the exact same thing, but it wasn't regulated the
5 same way, because it's a different compound.

6 So I think -- and I get it here. There are
7 thousands of compounds. These compounds are known to
8 have beneficial purpose. They make things slippery,
9 they make things float, they make things fire
10 retardant.

11 So I think, for me, I would want to regulate
12 these compounds in the way that is an umbrella. I'd
13 want to put up an umbrella that protects the
14 environment from the majority of things that our
15 great-grandchildren are going to benefit from.

16 And so maybe you need a bit of an umbrella
17 regulation, the Endangered Species Act, for example.
18 I'm just picking on that. But, you know, you can pick
19 on a keystone species to protect an entirety
20 ecosystem, and that's successfully happened.

21 I'm not saying we need to do that here.
22 This -- this case is not related to Endangered Species
23 Act, but we need to think about those compounds. What
24 are the -- the keystone compounds, if you will, that
25 can give us a broad regulation for them. Does that

1 make sense?

2 Q It does. Thank you. I'm just thinking of
3 all the clothes I've applied Scotchgard to now.

4 A Yeah. And you and I both breathing it;
5 right? Yeah. And it's, like, in the rear-view
6 mirror. Maybe not such a -- we didn't know.

7 MR. BLOOM: Yeah. Thank you. No
8 further questions. Thanks.

9 HEARING OFFICER: Mr. Ampomah?

10 CROSS-EXAMINATION

11 BY DR. AMPOMAH:

12 Q Thank you, Professor Spears, for being here
13 today. I do have a couple of questions for you. In
14 your testimony, Exhibit 79, on Page 4, you talk
15 about -- so on Line 8, "From my own published research
16 into subsurface microbial-influenced corrosion of
17 steel, I know that subsurface operation of aquifers is
18 near impossible in the oil and gas industry over a
19 longer timeframe."

20 So my first question will be, what timeframe
21 are we talking about here?

22 A Good question. So I had somebody send me a
23 piece of pipe that went downhole to deliver sand in a
24 fracking operation in west Texas. So you, know you,
25 have a hole, and put you stuff down the hole. This

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1 was the pipe that comes off of the spool that goes
2 down to inject sand.

3 And that pipe, they would bring it back up
4 within a week's time, because it was getting so
5 corroded, either chemically or biologically, downhole.
6 Corroded to the point where it was -- you could see
7 through it, and they didn't want to jam their hole up
8 down there.

9 So timeframe could be -- if you think like a
10 microbe -- a microbe doesn't think, but it works like
11 you do. It -- it wants food, it wants water, it wants
12 fuel, and it wants something to breathe. So those
13 things we call the subsurface is -- is life in the
14 slow lane; it's slow metabolism down there because
15 there may not be enough water, there might not be
16 enough carbon.

17 So you could be thinking about a timeframe
18 of pipe metal decay that that goes from the moment
19 it's placed in the ground to, say, 200 years.

20 Is -- that's my long-winded answer to your timeframe.

21 Q So, more or less, 200 years? Now based on
22 the cross-examination between you and Mr. Rankin and
23 also OCD Attorney, it seems like you have not really
24 done work with a specific steel that is actually being
25 utilized in the oil and gas industry?

1 A I don't know the answer to that 'cause I
2 don't have the knowledge for which steels they're
3 using on a regular basis in which location.

4 Q Yeah. So that a little bit of a concern,
5 because if you look at your testimony, you have a
6 direct testimony in attributing the work that you've
7 done on a particular steel, and making a broad
8 conclusion that seems like what you did is, more or
9 less, applicable to the material that is actually
10 being used in the oil and gas industry?

11 A So my answer to that would be that we were
12 using -- we were testing and working with the material
13 that's used in the oil and gas industry for pipelines.
14 And pipelines are -- to me, that's a near-surface
15 installation which is still subsurface.

16 That's why I went that way. So if I asked
17 you if a spring is popping out of the ground, is that
18 surface water or is that groundwater coming up to
19 surface expression?

20 Q Well, I'm asking the questions here.

21 A Sorry. Apologize. I -- I apologize.

22 Q Yeah. You know, some of your testimony is
23 very direct and straight, and it makes it really
24 difficult to really think about what is actually
25 happening in the oil and gas industry, and then more,

1 like, the generalization of the -- let's say, of the
2 testimony.

3 Now, let me move on. You talk about, on
4 Line 17, "We do not know what is really happening in
5 the deep surface with the metric terms," it goes on
6 and on. "The oil and gas industry would also have you
7 believe that a near-surface aquifer of -- for drinking
8 water is not impacted by deep oil and gas operations
9 and contamination."

10 Do you have any evidence to suggest
11 otherwise?

12 A I know that the oil and gas industry with
13 their engineering principles, and design, and how they
14 do extraction of a resource are top notch. They
15 install structures to protect a near-surface aquifer,
16 say, within the top 500 feet as they drill on down
17 below; right?

18 And I admire that -- that protection. What
19 I worry about is in the long haul of time. Are those
20 protections going to work 100 years from now as well
21 as they're working today? They have design lifespan
22 that often doesn't include microbes.

23 I know that microbes love to eat just about
24 anything, and I know that microbes are in the
25 subsurface. I know that microbes love metal, and I

1 know that they love steel. So I can't predict, and I
2 don't think oil and gas industry could either, because
3 it would be hard to design for 100 years or 500 years
4 or a 1,000 years for a tremendous column, a long
5 needle that's going in to get this resource out.

6 So I worry that eventually, there will be
7 connectivity. What is the timeframe of that
8 connectivity? I don't think we always know. We know
9 that there is a lot of natural and anthropogenic
10 seismic activity that's cracking and moving rock
11 around in the subsurface.

12 The earth has worked this way for 4 billion
13 years, and that cracking and connectivity changes, all
14 the time. Having said that, I, you know, admire the
15 protection of a near-surface aquifer today, the day
16 the well was put in. Can I guarantee that protection
17 tomorrow? I don't know the answer to that.

18 Q So in regards to that, and, you know, I do
19 appreciate your honest opinion with regards to the oil
20 and gas operations. Based on your submission then, do
21 you believe that there has to be extensive research
22 into how we do plugging of a well, because definitely
23 there's no well that is probably going to produce for
24 200 years; right?

25 A Right.

1 Q And it's going to be plugged. So do you
2 believe there has to be something there?

3 A I would love to do more research on how we
4 plug something. I know that there are self-healing
5 concretes, because you can have microbes built into
6 this -- into the concrete that will precipitate
7 calcium carbonate and backfill cracks.

8 Could you apply that sort of thing in a
9 subsurface environment? Perhaps. But that would be
10 fun to research.

11 Q Yeah. I think this is something that
12 probably NMOCD might want to look into, you know, with
13 regards to -- I know that in the oil gas industry, and
14 even in our research, we normally do not focus more on
15 microbes. So I think this is really important, and
16 thank you for that.

17 Now, let me ask you this question. What is
18 your assessment with regards to transparency when it
19 comes to the oil and gas industry?

20 A Can you say again?

21 Q What is your assessment, you know, in
22 regards to transparency, when it comes to the oil and
23 gas industry?

24 A Generally, I think oil and gas industry is
25 responsive to public's inquiry. I would like to see

1 more transparency, like, could I go somewhere and find
2 out exactly what isn't a drill fluid for, Well X in
3 Section Y on the northeast side of Carlsbad.

4 It would be fun to see things where I had
5 more information. Just as a scientist, as a
6 microbiology human, I would love to know what the bugs
7 are potentially eating. Are they eating Burger King
8 or are they eating Quiznos?

9 And if you think about it that way, it's,
10 like, that's an intriguing thing, and I would like
11 more information. Having said that, I mean, I also
12 think, you know, I understand proprietary compounds
13 and the needs for them. I just wish I knew more, and
14 I wish I knew more for future generations.

15 Q Yeah. So then let me turn to Exhibit 88.
16 That is the paper that was published by Professor Xu
17 from NMSU, when, you know, it's so interesting that
18 you brought it up. So I went in there to really take
19 a quick look at it.

20 Do you believe that the oil and gas industry
21 was more or less transparent when it comes to this
22 particular study?

23 A I do not know the -- how that study worked.
24 So I have no information. Given the information
25 that's published in there, I -- I like the samples

1 that -- that samples -- produced water samples were
2 analyzed. I like that they analyzed surface water. I
3 don't know the mechanisms of their relationships.

4 Q Yeah. But in the paper, they stated that
5 they got significant samples from the oil and gas
6 industry, allowing them to even sample the hydraulic
7 fluids.

8 A So I admire that. So obviously they're
9 working with somebody, and -- and their oil and gas
10 industry wants to know more too.

11 Q Exactly.

12 A Correct.

13 Q Now, so in that same paper -- and I know I
14 tried to get into that -- how did I -- so let's go to
15 the introduction. Okay. Give me a second. Let me
16 pull that out of here.

17 So in the abstract, they talk about various
18 minerals, salts, salt metals, and grease, volatiles.
19 They list a lot of compounds. Then also PFAS, as
20 well, were detected at different concentrations.
21 Chemical characterization of organic compounds found
22 in Pecos River water showed no evidence of produced
23 water origin.

24 A Right.

25 Q Now, but when you go to the conclusion, and

1 the Chair was talking about how they got 8 plus 8 also
2 in the Pecos water, and then also 5 or so in the
3 produced water, it's a little confusing.

4 A Yeah. I understand. So you can track
5 compounds in a fluid, for example, in this case,
6 water. And you can source track to where those
7 compounds may have come from. So if you're analyzing
8 a surface water, you can say they're coming from
9 humans living in the area, or upstream, for example.

10 If you see a different set of compounds in
11 the subsurface water, you could source track those to
12 a different source. And I think, in the abstract,
13 they're saying that the surface water is disconnected
14 from the produced water, because there is enough
15 difference in their geochemical data, including their
16 organic and inorganic data that shows that these look
17 like two different waters.

18 And it may not be just one compound that
19 they drew that assumption from. They could look at
20 the net whole and say, you know, these are two
21 different waters, just statistically this is not
22 possible for them to be the same.

23 This is a -- source tracking is a tough
24 thing in environmental science. You know, did a
25 raccoon take a poop, or did a bear take a poop? And

1 can you tell the difference between raccoon or bear?
2 I'm sorry to be graphic there, but, I mean, you know,
3 that's a source tracking of a microbe in a surface
4 water, for example. And you can geochemically do that
5 as well.

6 I work in Yellowstone National Park quite a
7 bit, up in Wyoming. I look at life at high
8 temperature in the hot springs, and we look at the
9 geochemistry of those hot springs to try to figure out
10 what's going on to feed the microbes in a hot spring.

11 You can have a hot spring that's right in
12 front of you, that's blue, on your right foot. You
13 can have one on your left foot that's yellow.
14 Completely different geochemistries, not even linked.
15 And I can tell just by looking at the geochemistry
16 that there are two different things.

17 My point of that is you can see the same
18 thing here. It -- is it a produced water's got
19 Content X and surface water's got Content Z. Long-
20 winded answer to your question. Sorry.

21 Q Yeah. So then, based on this article, and
22 probably based on your experience, you know, and if
23 you listen to the public comment, you know, like, "Oil
24 and gas industry is more or less contaminating our
25 water", is that easy, clear cut, you know, to -- at

1 least, based on this study, to conclude that it's the
2 oil and gas operation is, more or less, polluting
3 surfaces of water?

4 A I understand the notion of that. I think as
5 always, the proof has to be solid, as a science human.
6 What is the proof? And if we want proof, we need to
7 understand with more data. We need to know is a
8 produced water, for example, contaminating something
9 that's -- humans are getting exposed to.

10 A lot of produced waters are somehow
11 treated, possibly reinjected. There's a holy grail of
12 can we treat produced water to a level that allows for
13 agriculture, for example. Can we really clean up
14 produced water? It depends on how much time, energy,
15 and money you have to put into that problem, and the
16 total solidity and all of that.

17 But right now, I understand the sentiment.
18 I am a member of the public as well, and I'm concerned
19 for what's in my water. I think we all are. Water is
20 the -- you know, New Mexico's got three important
21 fluids. They've got water, oil, and natural gas. And
22 water's paramount because we can't go more than three
23 days without it, a as -- as a living human.

24 And we want that water to be of high
25 quality. We can get oil and gas from anywhere. We

1 can't get water from anywhere. That's why there's a
2 priority placed on water, in people's minds.

3 Q So definitely on Page 5 of your testimony,
4 then, I think we all in agreement that harmful
5 substances -- known harmful substances definitely
6 needs to be banned, you know, from any of our
7 operations, more or less, to safeguard our water.

8 Now, but that statement is very broad, you
9 know, and I know --

10 A Admittedly so.

11 Q Yeah. So what guidance are you giving to
12 The Commission? Are we, more or less, restricting
13 ourselves to the PFAS, as we've known that it is a
14 harmful substance, or there are others too?

15 A Speaking to The Commission as me, I would
16 say that we need to be careful here. We know that
17 these compounds are problematic. We know that they
18 are virtually everywhere, in our bloodstream, in our
19 water supplies, in our groundwater aquifers, in
20 multiple locations around the 50 United States, as
21 well as elsewhere in the world.

22 I think we need to think about having more
23 knowledge of what is being used. I think if the oil
24 and gas industry was using a -- a compound, they say,
25 "This gives us a better result." You know, if I use

1 A, I'm going to get a better result. If I use D,
2 maybe I'll get a less better result.

3 My point of that is, what do we regulate?
4 And with more data, more openness, more communication,
5 I think maybe we're going to understand how these
6 compounds work better. To get back to another food
7 analogy for me, if I said do you want ten toppings on
8 a pizza, does the tenth topping really matter? Can
9 you tell the difference with that tenth versus if I'd
10 only gave you a pizza with nine toppings?

11 And I suspect the oil and gas industry knows
12 exactly what Compound A does versus Compound D going
13 downhole, because they've tested this, you know, and
14 they know the result and the effect of what they're
15 going to get.

16 I would like to know the result and effect
17 of what that's going to give a groundwater, so that I
18 know more about how subsurface metabolism might work.

19 Q So with that, then, how do we draw the line
20 with gas to, you know, full disclosure, and then also
21 more like trade secrets. How do we draw the line?

22 A This is a tough question. Can we go back to
23 just where they're drilling with water only, no
24 compounds in it? It's probably not going to work for
25 a 5,000 foot deep hole; right? So what are the things

1 that work best? And I think that's going to
2 cause -- that's going to -- we're going to need more
3 study.

4 Maybe that's in-house oil and gas study,
5 disclosing what they're using, and what -- and what
6 they're testing, and what they're doing. Maybe it's
7 the academic side, or the government side that are
8 also researching best use, best practices.

9 I'm not saying oil and gas doesn't do best
10 practices. They do what works to generate a valuable
11 fluid that we need for energy.

12 Q Yeah. So then, I come to Page 7 of your
13 testimony, "Society needs to know what is going on,
14 what is going downhole in oil and gas operations."
15 Now, for full disclosure, would you also -- would you
16 support a commission, more or less, making a rule
17 where there will be a full disclosure to the
18 regulator, and not necessarily to the full public?

19 A I think if it was available for -- this is a
20 good question. I think it would be -- more
21 information would be certainly, helpful. More
22 information would be helpful for people like me doing
23 research. More information would probably be helpful
24 for the government so they better understand how to
25 regulate compounds.

1 I don't think that we should hide anything
2 from people, in a democracy. I think that we should
3 be transparent with what's in your water. You should
4 know what's in your water. You should know where it
5 comes from. You should know where your waste water
6 goes.

7 Q Well, as professors, we do, more or less,
8 believe intellectual property. You know, so I can't
9 just take your materials and, more or less, go
10 implement somewhere without your approval; right? So
11 I think that also can be said with regards to how even
12 companies also operate.

13 But if you can give me a clear response, do
14 you support, more or less, a commission coming up with
15 a rule where there will be a full disclosure of
16 anything that goes downhole to the regulators and not
17 necessarily to the public?

18 A I would support that.

19 Q Thank you. Let me look through here. And
20 we've talked about a timeframe of the microbial
21 impact. So in civil engineering, definitely folks
22 that do -- probably materials engineering, that would
23 be more on the material side, do you do any research
24 that is trying to, more or less, go in there and try
25 to see which material is going to be really good for

1 the subsurface work?

2 A I'm smiling and laughing at that, 'cause
3 I've put in more than one grant proposal to work with
4 materials science and metallurgical engineering at the
5 Colorado School of Mines to do this. Can we make a
6 better alloy? Can we impregnate it with silver?
7 Because microbes don't like silver nanoparticles.

8 If we want to have silver nanoparticle
9 grains inside steel pipelines, that's going to add
10 tremendous cost. So probably not a solution from the
11 wallet side. Something from the microbial-influence,
12 corrosion mix side, something I would love if I could
13 make it happen, would be a probiotic yogurt.

14 What is the probiotic yogurt that we could
15 coat a pipe with such that it is protected; you're
16 protecting the microbiome of the pipe. Like, you're
17 protecting the microbiome of your gut by eating
18 yogurt.

19 Things like that would be fun topics to
20 explore and work with. I know that epoxy-coated rebar
21 slows down the corrosion of the rebar because the
22 microbes have to work through the epoxy first before
23 they get to the steel. It just slows the process
24 down. So I don't think things like an epoxy coating
25 are a long-term solution.

1 Q Now, with regards to -- now, with the UIC
2 plastics coming up, with massive amount of CO2
3 injection, do you see EPA doing enough with regards
4 to, like, let's say, the materials that we are putting
5 in to build some of these wells?

6 A For, like, CO2 injection?

7 Q Yes.

8 A I have the same concerns that are in my
9 testimony with regards to things like CO2 injection.
10 Yeah. So I think we're injecting a supercritical CO2
11 fluid down into a subsurface environment, and it's
12 just like the mayonnaise in your thigh. It's, like,
13 what are we doing here? I don't think we even
14 understand what we're doing there. And I -- I worry
15 about it.

16 Q Yeah. So there has been a lot of concern
17 with regards to corrosion, and even with recent work
18 came in the recent news as well. So do you know any
19 lab that is actually doing this type of work to, at
20 least, more or less, guide the government?

21 A Yeah. Good question. I don't, at the
22 moment. I also don't know what we're doing in the
23 labs. The collaborator that is on the Sowards paper
24 that's in my testimony for microbial-influenced
25 corrosion, they are at National Institutes of

1 Standards and Technology in Boulder, Colorado.

2 So NIST does a lot of testing of materials.
3 That's their job, for the Department of Commerce, to
4 feed government information, feed the -- feed
5 information to the government on such things. Are
6 they doing that?

7 I would assume that NIST is doing something
8 with super-critical CO2, and worries of that either in
9 Maryland or in Boulder. But I have not talked to
10 folks at NIST to confirm or deny that.

11 Q A side note, do you have any online classes?
12 I really want to enjoy your classes.

13 A Thank you. At this point, only during
14 COVID. There's a strong chance I'll shift to
15 something online. I teach a three-hour class on
16 Monday nights, but it's in person, so.

17 Q Okay. Awesome. Now, so on Page 12, where
18 you talked about the MIC seismicity, subsurface field
19 and transport, "The effects of MIC on subsurface
20 infrastructure is well known in the oil and gas
21 industry"; is that really true?

22 A I believe so. From the people I -- I've
23 talked to with personal communication in oil and gas,
24 everybody knows that stuff corrodes. It's just a
25 matter of how long, and over what timeframe. If you

1 are -- if you spend any time around an oil field,
2 you'll see corroded stuff.

3 Q So most of it is mostly on the material
4 side. But what about the fabric itself? The rock
5 itself, you know, in terms of the microbial impact?

6 A Yeah. Good question. So microbes will
7 change rock with time, because they can consume a
8 metal, for example. And that'll -- that could go
9 mobile itself. They can increase the pore spaces of
10 rocks just by eating rock. And that happens all the
11 time.

12 Q I do appreciate your knowledge and your
13 time. Very insightful. Thank you. Oh. One more.
14 So in your testimony you talk about unlined pits. Are
15 there still unlined pits in New Mexico?

16 A The ones I have been around have always been
17 lined. I don't know about other places in the world.
18 I worry about unlined pits elsewhere. I think in this
19 country, it's regulated to be so; correct?

20 Q Yeah. At least in New Mexico, you can't use
21 unlined pits.

22 A You can use online pits?

23 Q You cannot; right?

24 A You cannot -- not in this country. I don't
25 think so. What I worry about are things, I've seen

1 pictures of where a truck is discharging "something"
2 right out into sagebrush outside of Carlsbad, New
3 Mexico. It's not even going to a pit; it's just going
4 straight on the plants. I've seen photos of that.

5 Q Okay. Thank you.

6 A I -- I've actually -- I mentioned the
7 International Society for Subsurface Microbiology
8 meeting; those images were projected.

9 DR. AMPOMAH: Wow. Thank you.

10 HEARING OFFICER: Thank you,
11 Mr. Ampomah.

12 Is there any reason not to excuse
13 Dr. Spear at this time?

14 All right. Thank you very much for
15 your testimony Dr. Spear.

16 DR. SPEAR: Thank you. And I
17 appreciate your time, and I appreciate your questions,
18 and thanks for your time.

19 HEARING OFFICER: Mr. Davis?

20 MR. DAVIS: WildEarth Guardians calls
21 Melissa Troutman.

22 HEARING OFFICER: Great.

23 Ms. Troutman, do you swear or affirm to
24 tell the truth?

25 MS. TROUTMAN: I do.

1 HEARING OFFICER: Thank you.

2 Go ahead, Mr. Davis.

3 MS. MULCAHY: Madam Hearing Officer?

4 HEARING OFFICER: Ms. Mulcahy?

5 MS. MULCAHY: I would just like to

6 renew NMOGA's objection to the testimony of

7 Ms. Troutman on the same or similar grounds for which

8 we filed a motion in limine, that, you know, this is

9 not a spills rulemaking.

10 Not only is it not a spills rulemaking,

11 there would not have been proper public notice of

12 anything about spills. And so we would renew that

13 objection. I'm happy to make that just a standing

14 objection, so that it's easier for you and The

15 Commission.

16 HEARING OFFICER: Yes. You have a

17 standing objection, and as I mentioned to The

18 Commission yesterday, the motions to exclude or limit

19 the testimony from Ms. Troutman were overruled.

20 And the acknowledgement that I made on

21 the way to denying those motions was that she seemed

22 like more of a fact witness than someone who was

23 offering, for example, scientific opinions. But

24 you'll hear about why that is as Mr. Davis explores

25 her testimony with her.

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Go ahead Mr. Davis.

DIRECT EXAMINATION

BY MR. DAVIS:

Q Hello, Ms. Troutman. Can you please state and spell your name for the record?

A My name is Melissa Troutman. M-E-L-I-S-S-A T-R-O-U-T-M-A-N.

Q Did you prepare direct to testimony for this proceeding?

A I did.

Q Is that WildEarth Guardians Exhibit 91?

(WildEarth Guardians Exhibit 91 was marked for identification.)

A It is.

Q Do you have any changes to that written testimony?

A I do.

Q Can you please explain the change?

A Sure. So there was a typo, and let me see. So on Page 2, Line 22, there was a typo there. That line reads "1,236,574 barrels were produced water, of which," -- and the -- the incorrect number is 507,5517. I put an extra five in there. So that number is 507,517 barrels were lost.

Q Do you have any other changes to your

1 testimony?

2 A I don't.

3 Q Did you review and rely on any documents to
4 prepare your testimony?

5 A I did.

6 Q And those are WildEarth Guardians
7 Exhibits 92 and 93?

8 A Correct.

9 Q Is your CV also an exhibit to your
10 testimony?

11 A It is.

12 Q Is that WildEarth Guardians Exhibit 90?
13 (WildEarth Guardians Exhibit 90 was
14 marked for identification.)

15 A It is.

16 Q Is your testimony true and accurate to the
17 best of your knowledge?

18 A Yes.

19 Q Do you adopt your written direct at
20 WildEarth Guardians 90 -- Exhibit 91 as your sworn
21 testimony today?

22 A I do.

23 MR. DAVIS: Madam Hearing Officer,
24 WildEarth Guardians moves for admission of WildEarth
25 Guardians Exhibit 90 through 93.

1 HEARING OFFICER: Let me pause for a
2 moment in the event there are objections, other than
3 the standing objection I've already recognized from
4 NMOGA.

5 All right. Exhibits 90 through 93 are
6 admitted.

7 (WildEarth Guardians Exhibits 90
8 through 93 were received
9 into evidence.)

10 MR. DAVIS: The witnesses is available
11 for questions from the parties and The Commission.

12 HEARING OFFICER: Thank you very much,
13 Mr. Davis.

14 Is this you, Ms. Mulcahy?

15 MS. MULCAHY: Yes. Thank you.

16 CROSS-EXAMINATION

17 BY MS. MULCAHY:

18 Q Good morning, Ms. Troutman.

19 A Good morning.

20 Q Thank you for -- sorry. Thank you for being
21 here. Ms. Troutman, you are not a data scientist;
22 correct?

23 A Correct.

24 Q And you are not a data analyst; correct?

25 A Correct.

1 Q And the exhibits that you have provided,
2 which are Exhibits 92 and 93, that you state are -- is
3 data pulled from the OCD site, have not been
4 independently QA/QC'd; is that correct?

5 (Exhibit 92 and Exhibit 93 were marked
6 for identification.)

7 A No. Although let me pull up the date for
8 you here. No. We'll leave it there for now.

9 Q Okay. And, Ms. Troutman, in Exhibits 92
10 and 93, you talk about spills, in your testimony;
11 correct?

12 A I do.

13 Q And you are not -- you do not know whether
14 these spills that have been identified in your
15 testimony are from initial C141s, or final C141s;
16 correct?

17 A No. I didn't look at all of the C141s for
18 each individual spill.

19 Q Okay. And so you don't know if the -- there
20 was a final determination that there was in fact a
21 spill that affected groundwater, then; correct?

22 A Correct.

23 Q Okay. And, Ms. Troutman, you, in
24 Exhibit 90, which is your CV?

25 A Correct.

1 Q You call yourself a "climate and energy
2 advocate"; is that correct?

3 A Correct. That's my current title.

4 MS. MULCAHY: Thank you, Ms. Troutman.
5 I have Nothing further.

6 HEARING OFFICER: All right. Thank
7 you.

8 Mr. Maxwell, do you have questions of
9 Ms. Troutman?

10 MR. MAXWELL: I have no questions for
11 Ms. Troutman. Thank you.

12 HEARING OFFICER: Thank you.

13 Ms. Kessler, do you have questions of
14 Ms. Troutman?

15 She may have stepped away.

16 Mr. Tremaine, do you have questions of
17 Ms. Troutman?

18 MR. TREMAINE: I think I have just a
19 couple of questions. Thank you.

20 CROSS-EXAMINATION

21 BY MR. TREMAINE:

22 Q Good morning, Ms. Troutman.

23 A Good morning.

24 Q I am Jesse Tremaine, the counsel for the Oil
25 Conservation Division. Did you -- prior to pulling

1 the spills data that you have listed in WildEarth
2 Guardians Exhibit 92, did you confer with anyone at
3 the Oil Conservation Division about the necessary
4 process to pull that data?

5 A I did. I -- I received instruction on how
6 to navigate OCD's incident and spill databases from
7 OCD's environmental project supervisor, Cory Smith, on
8 two separate occasions, once on January 18, 2023, and
9 again on February 16, 2023.

10 And then on October 18, 2024, I also shared
11 my methods for using both of those databases with OCD
12 Deputy Director Brandon Powell, who, at that time,
13 confirmed that I was sorting the data and collecting
14 it in order to find total spills, total volumes, and
15 spills where there had been impacts to water sources,
16 correctly, the way he would have as well.

17 Q And did you -- when you pulled this data,
18 did you comport with the process that was discussed
19 for generating this report?

20 A Can you say that again?

21 Q Did you follow the steps outlined in your
22 discussions with OCD Staff?

23 A Oh, yes. Yes.

24 Q A couple real quick clarifying questions,
25 about subject matter. So am I understanding, you

1 know, your testimony to articulate a concern of spills
2 of produced water -- the effects of spills of produced
3 water that may contain additives that are used in
4 completions or other downhole operations?

5 A Can you say that again?

6 Q That was a long one. Let's break it up. So
7 the spills and releases data is fairly characterized,
8 particularly the water data -- produced water is
9 reported volumes of produced water spills; correct?

10 A Correct.

11 Q Okay. And the -- as I understand the
12 concern -- I just want to make sure I understand this
13 correctly. As I understand the concern, certainly
14 there are -- there may be constituents of concern
15 in -- to you in produced water, but of chief concern
16 is that if PFAS or other additives are used in
17 downhole operations and completions, it is possible
18 that those are -- that those same additives are
19 present in the produced water that's produced from the
20 well; is that -- that was another long one. Sorry.

21 A No, I think that's correct. I've heard that
22 concern from a lot of people. I don't state that
23 concern in my direct testimony, but it's something
24 that I generally understand to be true.

25 Q That's where I'm getting at. PFAS and

1 completions compounds are part -- potentially part of
2 the volumes that you described in your exhibit and
3 testimony; correct?

4 A That's my understanding.

5 MR. DAVIS: Okay. No further
6 questions.

7 HEARING OFFICER: All right. Thank you
8 very much.

9 Mr. Davis, any follow-up?

10 MR. DAVIS: No redirect.

11 MS. TROUTMAN: Thank you.

12 Commission, Mr. Chair, do you have
13 questions of Ms. Troutman?

14 MR. RAZATOS: I do.

15 CROSS-EXAMINATION

16 BY MR. RAZATOS:

17 Q Thank you, Ms. Troutman, for appearing. We
18 appreciate it. Ms. Troutman, and I believe this is
19 something that the OCD was just alluding to as
20 well -- please help me kind of understand what are you
21 wanting The Commission to know here?

22 You're telling us about these spills, and
23 you're telling us how much was produced, how
24 much -- how many barrels were lost. What exactly are
25 you trying to make The Commission understand?

1 A I am simply trying to make -- trying to
2 provide, for The Commission, total numbers of spills,
3 and volumes, and impacts to freshwater resources. I
4 just want them to -- I just -- I would like you all to
5 know the numbers.

6 I don't -- I'm not going to -- I
7 don't -- I'm not going to draw any conclusions from
8 that other than that I -- you know, I think it's
9 valuable to know that spills do occur. They occur at,
10 you know, significant numbers. And some of those
11 spills have impacted both groundwater and
12 watercourses, surface watercourses.

13 Q Okay. And again, I apologize, I'm still
14 trying to make that connection. I realize that you're
15 here as a witness of fact, so I understand that.
16 So -- but you generated this information with a
17 thought process in mind.

18 Was it just purely to let The Commission
19 know about the spills? I mean, we could pull this
20 data as well. Do you -- you created this data for a
21 reason?

22 A Yeah. I created it because the aggregates
23 of spills, and volumes, and aggregates of spills that
24 have been reported to have affected water resources
25 are not aggregated anywhere else. And so yes, you're

1 right. You could have pulled that data and done this
2 basic math -- math yourselves, of course. But I
3 didn't want to assume that that would happen.

4 Q Okay. So I guess, from my understanding of
5 what you're saying, you want us to know about these
6 spills, and hence infer that these spills are allowing
7 the release of chemicals, including PFAS, into our
8 groundwater and our surface waters; is that a good
9 assumption?

10 MS. TROUTMAN: I thoroughly trust you
11 guys's ability to make whatever inferences or whatever
12 that you want to make from that.

13 MR. DAVIS: Okay. I -- and I
14 appreciate, I guess, I have no other questions. It's
15 just I can't -- I'm trying to see the connection here.
16 So -- but I appreciate your answering to the best of
17 your abilities. Thank you. No other -- no further
18 questions.

19 HEARING OFFICER: Thank you.

20 Commissioner Bloom?

21 MR. BLOOM: Thank you.

22 CROSS-EXAMINATION

23 BY MR. BLOOM:

24 Q Good morning, Ms. Troutman.

25 A Good morning.

1 Q Could you walk us through how you got this
2 spill data from OCD?

3 A Sure. I stated in -- I actually go to great
4 details in my direct testimony. Is it okay if I just
5 read that?

6 Q Absolutely. And you can summarize too.

7 A Okay. So there are two databases where
8 spill information is -- is reported and publicly
9 available. One is the incident database. One is the
10 spill database. They both compile spill reports, but
11 they do so in different ways, which can, at first
12 glance, make it seem like, you know, the number of
13 spills in each doesn't really match.

14 So there are some sorting mechanism -- there
15 are some sorting that has to be done to really get
16 to -- you know, to whittle the data down to the right
17 numbers, so to speak. So one of -- the way that I did
18 that is -- well, A, it's important to use both data
19 sets to -- I think, in order to crosscheck.

20 And when I've spoken with OCD personnel such
21 as Cory Smith in the past, that is something that was
22 recommended to me to do, both -- to run numbers in
23 both databases, eliminate duplicates, and make sure
24 that -- and -- and be able to cross check the numbers.
25 So that's what I did.

1 I picked a date range, January 1, 2010, to
2 October 15, 2024, and I used that same date range in
3 both the incident and spill databases. Once I got the
4 initial results in the incident database, I then
5 filtered those results to remove all of the gaseous
6 categories.

7 So I removed things like natural gas, vented
8 natural gas, flared carbon dioxide, hydrogen
9 solidified, methane, 'cause obviously those are not
10 liquid spills, which I was trying to sort down to.

11 And that left, you know, 16,618 fluid spill
12 incidents that included everything from acids, brine
13 water, crude oil chemicals, diesel, gelled brine,
14 flack -- frack fluid, gasoline, motor oil, produced
15 water, and other types of fluids.

16 But I also filtered for produced water. And
17 of those total fluid spills, you know, there's
18 a -- there's -- you -- there's a column for what
19 the -- the spill material is. And so I sorted for
20 just produced water spills, and found that 10,657 of
21 those were -- of those spill incidents identified
22 produced water as the material spilled. So that's the
23 incidents database.

24 Over to the spill database. The way the
25 spill database is different is that in the spill

1 database, every spill material is listed separately.
2 And some of those materials can come from the same
3 spill incident. So that's why the numbers are going
4 to, you know, seem a little different at first.
5 But -- so --

6 Q Excuse me. Just to clarify that, so you
7 could have one incident, but three separate data in
8 the spill database? It could have been three
9 separate -- three different types of fluids that were
10 found?

11 A Correct.

12 Q Thanks. Go ahead.

13 A So for that same date range, I also looked
14 at the spill database. And for all spilled materials
15 between that same date range, I got a total of 164,072
16 spills of liquid material, of spills for that date
17 range, of which 19,812 identified liquids or fluid
18 materials spilled.

19 And I got down to that 19,812 liquid spill
20 number by removing incident types like flares, vents,
21 vents with flaring. But I also, further, I wanted to
22 make sure that even though I was removing those
23 incidents, I was still making sure everything that was
24 not liquid was actually removed.

25 And so I further sorted out of the material

1 column; I removed again, natural gas, methane, carbon
2 dioxide, hydrogen sulfide, natural gas flared, and
3 natural gas vented. And as a last -- as a last sort,
4 just to be extra, extra cautious, I eliminated MCF as
5 a unit of volume from Column S. So obviously if
6 something is measures in MCF, it's probably not a
7 liquid. Yeah. Does that answer your question?

8 Q That was very helpful. Thank you. I
9 appreciate that. Okay. The chair asked you why you
10 pulled the data. We got that answer. Just any other
11 thoughts about how this informs WildEarth Guardians'
12 proposal, your effort?

13 A I mean, I -- you know, what Mr. Tremaine
14 said resonates, that, you know, these -- when we're
15 talking about things that are put downhole that also
16 come back up, and that those things that come back up,
17 which can contain what goes downhole when they are
18 spilled, you know, it's -- I -- it's relevant for that
19 reason. Spills are relevant for that reason.

20 Q Thank you. To your knowledge, Ms. Troutman,
21 has any party here submitted different figures from
22 yours, or run their own analysis?

23 A I'm not aware of any.

24 Q Me neither. Thank you. And then finally,
25 on the spills, we heard from Dr. Spear; this is

1 something we see at the land office. But would spills
2 include intentional dumping of fluids in a field?

3 A No. I -- well, spills are self-reported.
4 To my understanding, they're self-reported by
5 operators, but also can be found by the department.
6 And so my -- my guess is that if somebody found that
7 an operator had intentionally dumped something, I -- I
8 don't know. I don't know if that would be categorized
9 as a spill or not. I don't know.

10 Q That's fine. I think there are instances
11 where other agencies will find a spill and enter it,
12 I'd have to double check. But -- and do you think it
13 would be about the same for incidents where somebody
14 drives a truck down the road, pulls the plug, and
15 spills liquids out onto the roadway?

16 A What would be the same? Sorry.

17 Q Oh. Do you think it would be handled in a
18 similar way when someone pulls the plug on a truck,
19 drives it down the highway with the truck open, and
20 thereby releases the produced water, or other liquids
21 onto the roadway?

22 A I -- I don't know who does the handling or
23 how it would be handling in your question.

24 Q Okay -- reports of that too, so I was just
25 wondering about that as well.

1 A Okay.

2 MR. BLOOM: Ms. Troutman, thank you.
3 No further questions.

4 HEARING OFFICER: Thank you,
5 Commissioner Bloom.

6 Commissioner Ampomah?

7 DR. AMPOMAH: Thank you. Do have few
8 questions.

9 CROSS-EXAMINATION

10 BY DR. AMPOMAH:

11 Q Quick one. As you went through this data,
12 let me ask you the same question that I asked before.
13 How do you assess the transparency when it comes to
14 the oil and gas industry?

15 A Sorry. Can you say that again?

16 Q How do you assess transparency with regards
17 to the oil and gas industry?

18 A That was not something that I did when
19 pulling this data.

20 Q Now, I'm just asking you, as you pull the
21 data, as you went through the database, as you are
22 pulling this data, I'm asking you, or even you are
23 part of the New Mexico Produce Water
24 Consortium -- Research Consortium?

25 A Uh-huh.

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1 Q So I'm asking you, based on your experience
2 working with the oil and gas industry, and even the
3 database that you pulled the data from, how would you
4 assess the transparency when it comes to oil and gas
5 operations in the state of New Mexico?

6 A My understanding is that I'm here as a fact
7 witness, and I am not -- I'm not going to give any --

8 HEARING OFFICER: I think -- yeah. I'm
9 sorry to interrupt. I think there have been several
10 questions of you, by also the other commissioners,
11 that are drawing her out in areas that she wasn't here
12 to testify to.

13 So what she did was she collected
14 information from the State database, and presented it.
15 So that should be the focus of your question.

16 BY DR. AMPOMAH:

17 Q Yeah. So then the question still remains,
18 how is this relevant to, let's say -- you know, how is
19 this relevant to help us to make decisive decisions?
20 But let me ask you one more. And if it's not, then
21 you stop me.

22 So you talk about 181 -- 187 spills were
23 identified as having reached a watercourse, and 99
24 spills were identified as having affected groundwater.
25 Can you explain how this was determined, and the

1 approach that came to this conclusion?

2 A So in OCD's spill database, there is a
3 column for what -- where -- there's a column that
4 indicates whether there has been impact to water
5 resources. There's a column for groundwater, and
6 there's a column for watercourses or waterways. And
7 so I added up the spills that had "yes" in those
8 columns, respectively.

9 Q So I don't know if you can speak to this.
10 So in the New Mexico Produced Water
11 Consortium -- Research Consortium, so they collect
12 produced water, and even they analyze the produced
13 water as well. Some of the team members do that. I
14 know in NMSU, they do that -- New Mexico Tech, they
15 also do that.

16 Do you see any clear correlation, you know,
17 between the components in the produced water and then
18 also in -- on the ground water?

19 A That is outside the scope of my testimony.

20 HEARING OFFICER: That's beyond the
21 scope of her testimony.

22 DR. AMPOMAH: Okay. I'm done. Okay.

23 HEARING OFFICER: They're good
24 questions, just not for this witness.

25 Mr. Davis?

1 MR. DAVIS: Madam Hearing Officer, if I
2 could be granted leave to move into evidence one of
3 the exhibits that I failed to move?

4 HEARING OFFICER: Certainly.

5 REDIRECT EXAMINATION

6 BY MR. DAVIS:

7 Q Ms. Troutman, you also relied on WildEarth
8 Guardians Exhibit 3 in preparing your testimony; is
9 that correct?

10 (WildEarth Guardians Exhibit 3 was
11 marked for identification.)

12 A Oh. Yes. Yes, I did.

13 Q Can you describe that exhibit?

14 A That exhibit is titled "NMED Water Resources
15 and Management Percentage of Drinking Water from
16 Freshwater dot PDF" So that is -- that exhibit
17 is -- pulls a statement from NMED that states that
18 "Approximately 78 percent of New Mexicans depend on
19 groundwater for their drinking water.

20 81 percent of New Mexicans are served by
21 public systems with water derived from groundwater
22 sources. And over 170,000 New Mexicans depend on
23 private wells for drinking water."

24 It goes on to say "Groundwater makes up
25 nearly half of the total water annually, withdrawn for

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1 all uses in New Mexico, including agriculture and
2 industry and is the only practicable source of water
3 in many areas of the state."

4 Q And you've accessed that webpage before?

5 A Yes.

6 Q And WildEarth Guardians Exhibit 3 is a true
7 and correct copy of that webpage?

8 A Yes.

9 MR. DAVIS: Madam Hearing Officer,
10 WildEarth Guardians moves, WildEarth Guardians
11 Exhibit 3 into evidence in this proceeding.

12 HEARING OFFICER: Let me pause in the
13 event there are objections?

14 MS. MULCAHY: I have no objection,
15 Madam Hearing Officer.

16 MR. TREMAINE: None.

17 HEARING OFFICER: All right. Thank you
18 very much. Exhibit 3 is admitted.

19 (WildEarth Guardians Exhibit 3 was
20 received into evidence.)

21 HEARING OFFICER: At this point. Is
22 there any reason not to excuse Ms. Troutman? No?

23 Thank you very much, Ms. Troutman, for
24 your testimony.

25 How would the parties feel about taking

1 a lunch earlier today rather than later? When we come
2 back, we still do not have the NEE witness. My memory
3 is that the NEE witness is available starting at one
4 o'clock tomorrow. So when we come back today, I
5 believe we would move to the Division.

6 And I believe you were hoping to have
7 all of your witnesses one after the other without
8 being interrupted by other parties' witnesses?

9 MR. TREMAINE: It -- certainly, Madam
10 Hearing Examiner, it's always our preference. And I
11 think it's lining up to achieve just that. We'll be
12 calling Dr. Court Sandau and Dr. Erik Martin, then
13 Deputy Director Brandon Powell in that order.

14 HEARING OFFICER: Thank you very much
15 for offering. I was about to ask.

16 All right. Let's come back at 12:30.
17 Is one hour enough? Yeah? All right. Thank you.

18 (Off the record.)

19 HEARING OFFICER: We are coming back
20 from a lunch break now. We're turning from the
21 presentation by WildEarth Guardians to a presentation
22 by the Oil Conservation Division. Do you have any
23 matters to take up before we return to Mr. Tremaine
24 and Mr. Powell, Drs. Martin and Sandau? No? All
25 right.

1 Mr. Tremaine --

2 Oh. Sorry. I meant to say that
3 immediately upon taking lunch break, I did ask the
4 parties based on some of the input I got from The
5 Commissioners, if they would introduce their witnesses
6 and just get approximately a three-minute summary from
7 them before we launch into cross-examination.

8 So, Mr. Tremaine?

9 MR. TREMAINE: Thank you, Madam Hearing
10 Examiner, Commissioners, and parties. I am -- since
11 we came back into the room, I'm of course having
12 technical difficulties getting my VPN sorted here. So
13 I'm going to work on that to try and share exhibits as
14 possible, but I may need the grace of a little
15 patience there.

16 The Oil Conservation Division calls to
17 the stand Dr. Erik Sandau -- or, pardon me, Dr. Court
18 Sandau.

19 HEARING OFFICER: Dr. Sandau, do you
20 swear or affirm to tell the truth?

21 DR. SANDAU: I do.

22 HEARING OFFICER: Thank you.

23 Mr. Tremaine?

24 //

25 //

1 DIRECT EXAMINATION

2 BY MR. TREMAINE:

3 Q Good afternoon, Dr. Sandau.

4 A Good afternoon.

5 Q As you know, I'm Jesse Tremaine. I am
6 counsel for the Oil Conservation Division.

7 Dr. Sandau, did you prepare a direct testimony in this
8 matter on behalf of the Oil Conservation Division?

9 A I did, yes.

10 Q And is that direct testimony -- so to
11 reiterate, Dr. Sandau, you prepared direct testimony
12 on behalf of the Oil Conservation Division. And is
13 that testimony OCD Exhibit Number 10?

14 (OCD Exhibit 10 was marked for
15 identification.)

16 A Yes, it is.

17 Q Okay. And did you also prepare a Curriculum
18 Vitae in preparation for this hearing?

19 A Yes.

20 Q And is that OCD Exhibit Number 8?

21 (OCD Exhibit 8 was marked for
22 identification.)

23 A I believe it is, yes.

24 Q In preparing your direct testimony, did you
25 rely on any particular reference materials or sources?

1 A Yes. As included in -- in my report -- or
2 in my -- my report.

3 Q And those references are listed on the final
4 two pages of your direct testimony, Exhibit 10?

5 A Correct.

6 Q Okay. Is it necessary to make any changes
7 or clarifications to the -- to that exhibit,
8 Number 10, your direct testimony?

9 A No.

10 Q Okay. Do you adopt today, as your direct
11 testimony, the pre-filed, Exhibit 10 as true and
12 accurate?

13 A Yes.

14 Q Okay Thank you. Based on feedback from The
15 Commission and in discussion with the parties, I'm
16 going to ask you to provide a brief three-minute or
17 less summary of your direct testimony for The
18 Commission.

19 A Sure. Essentially, I was brought into this
20 project working as a contractor through VERTEX, and
21 with Dr. Martin, who you're going to hear from in a
22 little bit, to describe -- to come up with a
23 definition of PFAS.

24 That would seem simple enough, but PFAS is
25 a -- a very diverse group of chemicals consisting of

1 hundreds of thousands of different substances. So to
2 come up with a universal description as it applies to
3 the oil and gas industry and this particular
4 commission was a task that's as easy as you'd think.

5 And we concluded, from reading the reports,
6 reading what the science community had been talking
7 about over the last few years, this is a
8 definite -- this is an issue that's affected the whole
9 scientific community, of defining what PFAS is.

10 There's lots of articles that are discussing
11 this and organizations that are trying to do this. We
12 settled in on the OECD definition, with a caveat. The
13 OECD definition calls a PFAS a chemical with one
14 carbon or a -- a methyl carbon, fully fluorinated, or
15 an ethyl carbon, fully fluorinated.

16 And that's a very broad description that
17 covers tens of thousands, if not a hundred thousand
18 different chemicals. So it's a very broad definition.
19 And we settled on that to be clear, to -- if we -- we
20 could have further refined it to -- to be more
21 specific.

22 But we thought it would be best to -- to
23 keep it general, to be consistent with the general
24 scientific community, and what they're calling a PFAS.
25 With the limitation being the analytical methods that

1 are used to measure.

2 So you can see at the end of the
3 description, we say "as described in EPA
4 methodologies," and the methods are listed there, 1633
5 and such, which would limit the PFASs being monitored
6 to about 40 to 70 different chemicals.

7 MR. TREMAINE: Madam Hearing Examiner,
8 pursuant to OCD's noticed rebuttal testimony, I do
9 have a number of other questions that I'd like to ask
10 Dr. Sandau now.

11 HEARING OFFICER: That's fine.

12 MR. TREMAINE: Okay.

13 BY MR. TREMAINE:

14 Q Dr. Sandau, so in your testimony just now,
15 or in your summary, I believe that you indicated a
16 specific number of PFAS chemicals that would qualify
17 under OCD's proposed definition. So I want to back up
18 to -- the question is about PFAS, generally.

19 Given the existing OECD definition, absent
20 the limitations in terms of the methodologies that OCD
21 and yourself have proposed for the definition,
22 approximately how many chemical compounds would
23 qualify under that definition as PFAS?

24 A That is described in the OECD document that
25 did -- that first described that definition, and it

1 was about 5,000.

2 Q Okay. And once you apply the specific
3 methodologies that are proposed in the definition,
4 approximately how many chemical compounds would
5 qualify under that definition?

6 A Depending on which method is used, 40 to 70.
7 There -- there are analytical labs out there, right
8 now, that'll measure 70 -- all 70 of the chemicals
9 that are listed in those three methods in a single
10 analysis of a sample.

11 Q And of the total body of PFAS chemicals that
12 fall under the OECD definition, how many are known to
13 have industrial or practical use in your experience?

14 A And again, that's listed in the OEC [sic]
15 document, where they were describing all the different
16 PFAS that could be out there. When they did their
17 market research to figure out what chemicals were
18 actually relevant, it was less than 300 were
19 industrially -- industrially used or -- or
20 commercially used in -- in the world.

21 Q And at a high level, could you explain for
22 The Commission the different types of PFAS compounds
23 that exist?

24 A The different types? Different methods for
25 measuring, or the different types?

1 Q I'm looking at a summary of PFAS, generally,
2 like surfactants, et cetera.

3 A Oh. Right. Yeah. Again, PFAS is a arching
4 term that covers so many chemicals, and that can be
5 scary when we talk about a 100,000 chemicals that are
6 out there that are PFAS. They range in chemical
7 structure -- so I'm a chemist, so I'll talk about
8 chemistry.

9 They're small, PFASs, very small.
10 They're -- they're gaseous. They're -- that -- that's
11 because they're such -- such small sizes, they're
12 prone to be in the air. There's other PFASs that have
13 surfactant chemical -- surfactant properties. They
14 act like soaps, lubricants.

15 These have some common uses that -- and some
16 of most studied, so they'd be liquids at room
17 temperature. Then there's some molecules that are so
18 large that they're actually solids or waxes. And this
19 diversity in chemical structure causes PFASs to
20 be -- span all those -- all those different types of
21 phases.

22 And that impacts how they move in the
23 environment. That impacts their toxicology. That
24 impacts how we measure them. So when we talk about
25 PFASs, and group them under a name, just remember that

1 we're grouping a very large class of chemicals with
2 varying physical chemical properties that make
3 their -- when you talk about them as a group, they may
4 have something common, but they differ in how they act
5 at -- in the environment and in -- in toxicology.

6 Q And is it true, Dr. Sandau, that all of
7 those types or categories of PFAS that you described
8 fit within the OECD definition?

9 A Yes. They do.

10 Q And at the time that the OECD definition was
11 developed, were there any recommendations as to its
12 use or application by the developers? I'm asking, you
13 know, for instance, an application to NOCC rulemaking?

14 A Again, in that OECD document -- it's
15 a -- it's a publicly available document -- the authors
16 discussed why they were naming chemicals, and why they
17 were trying to come up with this unified nomenclature
18 for scientists and the public to understand.

19 And they recognized that that generic
20 description that we're talking about as PFAS, that
21 it -- that I described earlier, does cover many, many
22 chemicals, too many chemicals, and some that are quite
23 irrelevant to a lot of industries.

24 And they actually suggest in that document
25 that specific work groups or -- or concerned areas

1 where they are worried PFAS should maybe think about
2 limiting that description down to just the relevant
3 chemicals.

4 So even that group knew the shortcomings of
5 causing -- or of naming PFAS and -- and calling it
6 what it is, and including that many chemicals would be
7 problematic for certain industries, and be too big,
8 and too broad.

9 Q Thank you Dr. Sandau. I'd like to ask you a
10 couple questions about methodologies. We've heard
11 some testimony and questions over the course of this
12 hearing regarding OCD's proposal to include detection
13 and screening methodologies within the definition of
14 PFAS.

15 Could you please summarize, for The
16 Commission, the current state of PFAS detection and
17 quantification methodologies?

18 A Sure. We have a big group of chemicals with
19 different physical chemical properties. And so
20 there's different analytical methods that are used to
21 measure those. And I'm going to break it down into,
22 sort of, three main groups.

23 The first, what -- is what I call screening.
24 So there are measurements, though, that we do to
25 screen for organic fluorine. It's called a total

1 organic fluorine measurement. That would -- you take
2 the total amount of organic fluorine. That's
3 available in routine laboratories.

4 What that provides you is a number, but it
5 doesn't give you any idea of what's there. Doesn't
6 give you the number of constituents, you know, what
7 they are. You don't get that. You just get the total
8 amount of organic fluorine.

9 The second type, of measurement would be
10 what we call targeted analysis. So this is where
11 they've developed methodologies that are specifically
12 designed to measure those chemicals down to very low
13 levels, parts per trillion.

14 This is unheard of. Thirty years ago, when
15 I started my analytical chemistry career, to measure
16 the parts per trillion was unheard of. And now we're
17 regulating to those levels. Just to give you an idea
18 of how far we've come and how -- how low we can go.

19 Those methods, I think, The
20 Commission -- Commission was talking about
21 it -- about, you know, forensic methods and -- and
22 being able to measure that. You need proper QA/QC,
23 you need standards, you need to measure variability,
24 you need to monitor the instrument performance.

25 There's lots of stuff that goes in to it.

1 You need certified laboratories to do that. So there
2 they're reliable measurements. Those are very
3 important. They're the gold standard in environmental
4 measurements. It allows us to rely on the number, to
5 know the precision of that number, so that it's
6 dependable, enforceable.

7 Those are the -- those are the ones we
8 really want because that's the stuff that's usable
9 and -- and reliable for litigation, or knowing if
10 someone's compliant or not.

11 And the last one, which is a big research
12 component in -- in environmental studies, and -- and
13 in my world is non-targeted analysis. And it -- it's,
14 sort of, the holy grail, can we measure everything in
15 the sample?

16 And we can look for everything in the
17 sample. We probably can't measure everything in the
18 sample. So we may see peaks and -- but once -- once
19 you see a peak, we don't know what it is. So now we
20 have to identify it. So we have to figure out it's
21 molecular weight, and then we have to synthesize it,
22 and find a standard to be able to quantify it in a
23 reliable manner.

24 Those non-targeted analysis allow
25 researchers to screen for other things in the

1 environment. They're a good research tool, but it's
2 hard to enforce and to use on a routine basis.
3 They're really just a specialty tool to look for other
4 things that might be there.

5 Q Thank you, Dr. Sandau. And I think that
6 you, kind of, answered part of this question, but I'm
7 hoping you can provide a summary or a description of
8 how such methodologies are developed?

9 A So this comes down to the -- the targeted
10 analysis that I discussed. So when -- when we're
11 coming up with the definition, we limited it to those
12 EPA methodologies. And we listed five. We're going
13 to reduce it to the three that are water-based
14 methods.

15 These are methods that are developed for the
16 targeted measurement of those particular chemicals, to
17 very low levels. And, as I, sort of, alluded to
18 before -- didn't allude to, I actually talked about
19 it -- these are where we -- we know that these
20 chemicals are common in the environment.

21 They're common enough that we found them and
22 had to synthesize a chemical standard in order to
23 measure them that accurately. So we know that they're
24 around. They probably have all the toxicology data
25 associated with them. Because they've been found in

1 the environment, someone's gone and dosed a rat or
2 figured out, you know, what kind of effects they might
3 have, and made them important enough to -- to monitor.

4 These analytical labs have then taken the
5 standards and developed routine laboratory methods in
6 their certified laboratories that allow us to measure
7 to that precision of 4 or 10 parts per trillion, and
8 to know that when we measure 4 or 10 parts per
9 trillion, we know it's four plus or minus one, or
10 whatever that uncertainty is; right?

11 These labs also have the
12 controls -- mechanism, the blanks, as we were talking
13 about. Like, you need to know your blanks, with
14 something as ubiquitous as PFAS. You know, was it
15 collected -- were you wearing a -- a coat that had
16 PFAS applied to it, in the rain, and water is dripping
17 on your coat into the sample, causing it to be
18 positive for PFAS. But it's actually because of the
19 collection process.

20 Vials that have Teflon liners, which is
21 common in the laboratory industry, will add PFAS to a
22 sample. When I worked at the Centers for Disease
23 Control and we started to develop the methods to
24 measure PFAS, we struggled because our whole lab had
25 to be redone, 'cause we had Teflon everywhere.

1 And we had to revamp the lab and buy new
2 tubing in order to get the blanks low enough so that
3 we could measure the chemicals that we were measuring,
4 and not the laboratory levels that were naturally
5 present.

6 This all goes into -- to developing these
7 methods at these routine labs, so that we can get to
8 that precision. Four and ten parts per trillion is
9 extremely small concentrations. And so using
10 those -- those certified methods, those reliable
11 methods, we can categorize -- we can -- we are
12 confident that something is present, and it's present
13 to -- at a certain concentration, and we know what the
14 variability in that concentration is.

15 Q Thank you, Doctor. You mentioned the air
16 methods that were included in OCD's proposed
17 definitions. So I want to detour to that for a
18 second. Are you referring to OTM Method 45 and 50?

19 A Yes.

20 Q Okay. And were those included in the
21 proposed definition -- well, what was the initial
22 reason for including those in the proposed definition?

23 A When we were first talking about the
24 definitions, we were trying to, sort of, be all
25 encompassing of any analytical method that measures

1 PFAS, and thinking that maybe we needed to consider
2 things that might valadalize during a -- a
3 loss -- a -- loss incident in the oil and gas
4 industry.

5 So we just wanted to make sure that we had
6 those in there. After the fact, we realized that this
7 is all about water, or mostly about water. So we
8 tried to funnel the methods to be water based.

9 Q Okay. And given that both of those are
10 acknowledged as air methods, in your professional
11 opinion, and given the context of the hearing, do you
12 agree that it would be appropriate to remove those as
13 methods from the definition?

14 A Yeah. If they're -- if we're talking about
15 water, it's more appropriate to use those water-based
16 methods than an air method.

17 Q Okay. Doctor, earlier I asked you to
18 describe the number of PFAS that would fall under the
19 OECD definition. So now, moving on to the proposed
20 definition, inclusive of the methodologies. I think
21 you had indicated -- let me ask you to clarify; how
22 many PFAS would currently qualify under the complete
23 OCD-proposed definition?

24 A If you picked one method, it'd be about 40.
25 If you used all three methods, it would be up to 70.

1 And the routine labs are capable of measuring all 70
2 of those chemicals in -- in a water sample. So there
3 are laboratories capable of doing that on a routine
4 basis.

5 Q Okay. And thank you. Sorry for the repeat
6 question there. As -- Doctor, as testing
7 methodologies continue to develop, specifically the
8 methodologies listed in OCD's proposed definition, how
9 many PFAS chemicals will possibly fall under that
10 definition?

11 A I'll put on my Nostradamus hat a little bit,
12 I guess. You know, you -- as PFAS -- or as other PFAS
13 chemicals are discovered in the environment, those
14 routine methods will grow to encompass them.
15 They -- the reason why we measure 70 chemicals is
16 because they have found relevance.

17 They've been measured; we know that there's
18 a source. They have some toxicology that we're
19 interested in -- in protecting, of -- that's why that
20 list is there. So as we -- the science continues to
21 develop -- and everybody's researching PFAS; you go to
22 a scientific conference now, and that's all anybody
23 talks about now.

24 As we discover more and more of these
25 things, if they're relevant enough, they will get

1 incorporated into those methods and continue to grow.
2 So I -- I would expect that to grow upwards of 100, if
3 not maybe more, to be part of routine methods in the
4 future.

5 Q Okay. Doctor, in your professional opinion,
6 are there any problems associated with defining PFAS
7 as inclusive of chemicals which are either not
8 detectable or not quantifiable?

9 A Well, the -- the problem -- you -- those are
10 two different things. Detectable, PFAS data
11 sets -- I'm -- I'm -- I do a lot of forensic
12 fingerprinting, and trying to, you know, look at where
13 sources of contaminants are coming from.

14 And PFASs are bad data because they're so,
15 what we call, sparse. You'll get one hit of this
16 chemical in this sample, and you get one hit of this
17 chemical in that sample, and it'll be zeros,
18 non-detects in the middle.

19 And -- and then you'll measure that same
20 location later, and that chemical's gone. So
21 non-detect is a problem, 'cause they -- they appear,
22 disappear, and -- and you -- you don't -- you can't do
23 much about that.

24 Quantifiable goes to the, "how reliable is
25 the measurement?" And it goes to the -- the

1 blank -- controlling for the blanks, and making sure
2 it actually is a measurable thing, and quantifying
3 with a certified reference standard or a synthesized
4 standard so that we can measure to those very low
5 levels with the accuracy and the precision that we
6 need.

7 And that's where it's important, I think, in
8 being enforceable, is to be able to know what you're
9 measuring, be confident in the number that you got
10 from that measurement, so that you -- if there is some
11 procedure where you're -- you're trying to enforce
12 something, you -- you can rely on that number, and be
13 confident in it.

14 Q Doctor, during the course of the hearing,
15 we've heard some concerns or conclusions drawn
16 regarding the toxicity of PFAS based on the published,
17 like, groundwater levels. I'm wondering if you can
18 provide The Commission with any description as to,
19 like, how those -- the PFAS groundwater levels
20 are -- were described and how -- and what they mean.

21 A Yeah. I -- I guess it's just a word of
22 caution, that just because something's being regulated
23 to 4 or 10 parts per trillion, it doesn't mean it's
24 necessarily causing adverse effects at those levels.

25 We're capable of measuring to those levels.

1 When those -- when those levels were first proposed by
2 EPA, the whole environmental industry was up in arms,
3 'cause we weren't capable of measuring that low, and
4 we had to adapt.

5 And -- and the -- and the -- the laboratory
6 industry adapted, and was able to develop methods that
7 was -- that we could measure that level. That doesn't
8 mean that they have an effect. That just means that
9 our analytical chemistry had to evolve to be able to
10 measure at such low quantities to a reliable manner,
11 to be protective.

12 People are scared of PFAS. So the EPA and
13 government organizations that are in charge that are
14 enforcing these regulations or proposing these
15 regulations wanted to be precautionary in developing
16 methods that could measure to such low levels.

17 So don't draw a direct linear relationship
18 to a low -- a guideline, a regulatory limit being the
19 toxicity limit. That's -- that's just to -- to be
20 able to -- to be conservative and to measure to those
21 levels so we can be watchful in where these chemicals
22 are in the environment.

23 Q Doctor, did you review the rebuttal
24 testimony submitted by New Energy Economy from Witness
25 Dr. Hansen?

1 A I did.

2 Q Okay. And I think it's fair to characterize
3 that Dr. Hansen draws a different conclusion about the
4 proposed definition than you do. I'd like you to
5 provide The Commission with, in your professional
6 opinion, why do you think you two doctors arrived at a
7 different position or opinion?

8 A I think -- I think it's coming -- we're
9 coming from different angles, and it's totally fine.
10 It's not a -- it's not a right or wrong.
11 It's -- it's -- I think Dr. Hansen is coming from, "I
12 want to measure as much as I possibly can in the
13 samples so that we can ensure that nothing gets in the
14 environment that shouldn't be."

15 And that's a -- that's a valiant goal. I
16 think we -- you know, if we had the -- the Star Trek
17 tricorder that could measure everything and anything
18 and could get a value, we would; right? But that's
19 not available right now, currently.

20 So I came at it a little bit more of a
21 pragmatic approach, with the thought of, we have
22 to -- we have to regulate and enforce this, and we
23 need to use reliable analytical chemistry methods that
24 can do that, so that when we say someone is not
25 abiding by the rules, we can prove it, and we have the

1 information to do that with.

2 And -- and using those targeted analysis
3 that cover the -- the most concerning PFAS in the
4 environment with the most information out there, that
5 allows us to do that. And -- and remember that our
6 method is not limited, because it will grow as the
7 knowledge of PFAS in the environment grows so that new
8 chemicals are incorporated.

9 So you know, I was coming from a little bit
10 more pragmatic of an approach, I guess.

11 MR. TREMAINE: Thank you, Doctor. No
12 further questions from the division.

13 HEARING OFFICER: Thank you.

14 Mr. Rankin or Ms. Mulcahy, do you have
15 questions?

16 MS. MULCAHY: Yes. I do. And if it's
17 all right with you, Madam Hearing Officer, I -- can I
18 share my screen just so that it's easier for
19 everybody?

20 HEARING OFFICER: Yes.

21 Sheila, please allow of screen sharing.

22 MS. MULCAHY: Thank you.

23 MR. BLOOM: Interrupt for a second.

24 I'm not sure that I've seen Dr. Hansen's rebuttal,
25 NEE?

1 HEARING OFFICER: Let's see. It
2 would've been emailed to you, and I believe it was
3 last week; isn't that correct?

4 MR. TREMAINE: I don't want to speak
5 for NEE, but I believe it was shared to the parties on
6 November 4th.

7 HEARING OFFICER: All right. Hold on
8 just a moment, and I'll find it.

9 MS. MULCAHY: I have it right here,
10 Madam Hearing --

11 HEARING OFFICER: It was -- so I'm
12 going to -- what? Yeah. Around November 6th, maybe?

13 MS. MULCAHY: I have it, Madam Hearing
14 Officer. It was November 4th. And if Commissioner
15 Bloom has a question about it, I do have a copy that
16 has no notes in it whatsoever. I'd be happy to share
17 it with The Commission.

18 HEARING OFFICER: That would be nice.

19 MS. MULCAHY: I haven't done anything
20 to this document.

21 MR. RAZATOS: Madam Hearing Officer, --

22 MS. MULCAHY: I represent that
23 on -- under oath.

24 MR. RAZATOS: -- can we just make
25 copies of that for The Commissioners?

1 HEARING OFFICER: Yeah.

2 Sheila, would it be possible to get
3 hard copies of the Hansen rebuttal for The
4 Commissioners?

5 MS. MULCAHY: Madam Hearing Officer,
6 would you like me to wait until The Commission has
7 those copies?

8 HEARING OFFICER: Commissioners, is
9 that your pleasure? We can certainly stand down for
10 about five minutes.

11 MR. RAZATOS: Could we, please?

12 HEARING OFFICER: Yeah. All right.
13 Five-minute break.

14 (Off the record.)

15 HEARING OFFICER: Let's come back from
16 the break please. All right. The Commissioners have
17 now been provided with hard copy of the NEE rebuttal
18 packet.

19 Please go ahead, Ms. Mulcahy.

20 MR. TREMAINE: Ms. Hearing Examiner?

21 HEARING OFFICER: Oh. Sorry.

22 Mr. Tremaine?

23 MR. TREMAINE: I may please interject.
24 I apologize. In my fight with technology, I neglected
25 to move for admission of OCD Exhibit 8, Dr. Sandau's

1 Curriculum Vitae, and Exhibit 10, his direct
2 testimony.

3 HEARING OFFICER: All right. Any
4 objections to the admission of Division Exhibits 8
5 and 10?

6 Okay. They're admitted. Thank you.
7 (OCD Exhibits 8 and 10 were received
8 into evidence.)

9 HEARING OFFICER: Go ahead,
10 Ms. Mulcahy.

11 MS. MULCAHY: Thank you.

12 CROSS-EXAMINATION

13 BY MS. MULCAHY:

14 Q Good afternoon, Dr. Sandau. Thank you for
15 being with us.

16 A Good afternoon.

17 Q Dr. Sandau, I have pulled up here on the
18 screen, just to make things easier for us, what is OCD
19 Exhibit 1-003, which is the definition of PFAS that
20 the division has proposed; is that correct?

21 (OCD Exhibit 1 was marked for
22 identification.)

23 A Yes.

24 Q Okay. Thank you. And I've highlighted it
25 here in yellow, some language that I just want to ask

1 you about. Okay?

2 A Yep.

3 Q Okay. You gave some testimony regarding
4 analytical methods. When you were talking about
5 analytical methods, were you talking about United
6 States Environmental Protection Agency Standard
7 Analytical Methods 531.7?

8 A 537.1, yeah.

9 Q I'm sorry. 537.1?

10 A Yep.

11 Q And Method 533?

12 A Yes.

13 Q And Method 8327?

14 A Yes.

15 Q And Method 1633?

16 A Correct.

17 Q And together, these are the methods that you
18 said can analyze for about 70 PFAS analytes; is that
19 correct?

20 A That's correct.

21 Q Okay. And then here, I see you have also
22 listed OTM-45 and OTM-50; is that correct?

23 A Yes.

24 Q Okay. And OTM stands for other testing
25 method; is that correct?

1 A I believe so, yes.

2 Q Okay. And because it's an other testing
3 method, this method is not an EPA standard method; is
4 that correct?

5 A Yes. That's correct.

6 Q Okay. And so if a method is not
7 standardized, could you explain what that means?

8 A Sure. If it's not standardized, it hasn't
9 been adopted as an official method, which likely means
10 it hasn't gone through the validation process of
11 becoming a standard method, which, as I, sort of,
12 covered in piecemeal in prior testimony, is -- is
13 the -- the way of developing a method is to -- to have
14 it documented.

15 So it'll have to get written out. It'll
16 have to have all the QA/QC procedures documented in
17 that method that -- that the lab shall follow. It'll
18 have limits onto how the -- the laboratory is allowed
19 to rebound in those areas.

20 So how much fluctuation they're allowed in
21 certain things, what the limits are, what would be a
22 pass or a fail of accepting the data. So there's some
23 criteria that needs to meet, and that would all have
24 to be, sort of, written out and accepted, and then
25 through the validation process, to become a validated

1 EPA method.

2 Q And in your professional opinion,
3 Dr. Sandau, is it important to only utilize
4 standardized methods?

5 A Caveat on that one. Is it important to you,
6 only? It depends. It's -- it's a made-for-use;
7 right? So if we're -- if we're talking about
8 enforceability, and passing in -- in a -- in a
9 courtroom setting, say litigation, I would much rather
10 prefer having validated, approved methods because
11 they -- they've been pre accepted, and you know that
12 they've met a certain criteria in order to have gotten
13 to that stage.

14 And then we can validate the data based on
15 how that method was described to make sure the
16 laboratory has performed as they needed to in order to
17 provide reliable data. So on an enforceability,
18 litigation side of things, I am -- I do want to use
19 those standardized methods as much as possible.

20 Q Okay. Thank you. That actually, is a good
21 segue into my next question. It's almost like you
22 read my notes. Dr. Sandau, how do you enforce a
23 regulation -- if you have a broad definition of PFAS,
24 how do you enforce a regulation banning PFAS if the
25 definition is so broad that there's no analytical

1 method in existence that can analyze for all of the
2 PFAS in the definition?

3 A It -- it's extremely difficult to enforce.
4 And that's -- that's the problem of a broad
5 definition, and why you want to use those reliable
6 analytical techniques that are capable. But again, we
7 do have method -- analytical chemistry is highly
8 sophisticated. We can measure to such low levels and
9 measure lots of things.

10 And when -- and I should caveat the word
11 "measure"; we can see them. That doesn't mean
12 we're -- it means they're there. We may not even have
13 an identity for them. We just know there's a thing
14 there, that's present, that fits the description, and
15 came through that method, so it might be related to
16 what we're looking at.

17 Once that's done in those non-targeted
18 analyses, it then has to evolve into what is it? How
19 do I figure out what that particular substance is?
20 And you have to use high resolution mass spectrometry.
21 And you have to -- you have to get a lab to synthesize
22 a chemical in order to quantify that substance to the
23 degree that you need to.

24 So that's -- you can measure stuff,
25 and -- and to see it -- you can see stuff. But to

1 measure it, and rely on that measurement, that's where
2 you need those validated methods.

3 Q Okay. Thank you. And so OTM 45, that is
4 only an air method; is that correct?

5 A Yes.

6 Q And OTM 50 is only an air method as well; is
7 that correct?

8 A Yes. It's volatiles for air measurements,
9 yes.

10 Q Okay. And you also -- regarding analytical
11 methods, the methods that are listed here that I've
12 projected on to this screen, excluding OTM 45 and
13 OTM 50, or including them if you'd like, do you know,
14 do these methods analyze for PFOA P-F-O-A?

15 A I believe they do, yes.

16 Q Do these methods analyze for PFOS?

17 A Yes.

18 Q Do these methods analyze for PTFE?

19 A Yes.

20 Q Do these methods analyze for -- we've been
21 calling it FPEG, but let me say that acronym for you,
22 Dr. Sandau. Its fluroalkol alcohol substituted
23 polyethylene glycol, FPEG.

24 A I -- I remember the acronym and the name.
25 Even as a chemist, I struggle to figure out which one

1 that is.

2 Q Yeah. It's a lot to say.

3 A Now, I -- I don't know off the top of my
4 head if that one's included.

5 Q Okay. How about PFHXS?

6 A Yes.

7 Q How about PFBS?

8 A This a like a Trivial Pursuit.

9 Q I'm sorry. I don't mean it to be.

10 A I -- I'm -- I think that one is as well.

11 Q Okay. I only have two more Trivial Pursuit
12 questions.

13 A Okay. I hope get my pie.

14 Q Yeah. How about PFNA?

15 A Yes.

16 Q How about HPFO? The GenX PFAS?

17 A Yes.

18 Q Okay. And you testified, Dr. Sandau, that
19 you reviewed the testimony and rebuttal testimony of
20 Dr. Hansen; correct?

21 A Yes.

22 Q Okay. And Dr. Hansen listed six -- what she
23 called "six well-characterized PFAS", which are one,
24 PFOA; two, PFOS P-F-O-S; three, PFHXS; four, PFBS;
25 five, PFNA; and six, GenX, which if I understand what

1 you just stated in your Trivial Pursuit questions that
2 I was asking you, all of those are currently analyzed
3 for; is that correct?

4 A Yes.

5 Q Doctor, no more Trivial Pursuit questions.
6 You got your pie.

7 A Excellent.

8 Q You testified that PFAS are -- have a -- are
9 chemicals that have diverse properties; is that
10 correct?

11 A Yes.

12 Q Okay. Does that also mean that PFAS have
13 different toxicologies?

14 A Absolutely.

15 MS. MULCAHY: Okay. I don't believe I
16 have anything else. Thank you, Dr. Sandau.

17 DR. SANDAU: You're welcome.

18 HEARING OFFICER: Thank you,
19 Ms. Mulcahy.

20 Mr. Maxwell, do you have questions of
21 Dr. Sandau?

22 MR. MAXWELL: I do not have questions
23 for Dr. Sandau. Thank you.

24 HEARING OFFICER: Thank you.

25 Ms. Kessler, do you have questions of

1 Dr. Sandau?

2 MS. KESSLER: I do not. Thank you.

3 HEARING OFFICER: Thank you.

4 Mr. Davis?

5 MR. DAVIS: I do.

6 HEARING OFFICER: Great.

7 CROSS-EXAMINATION

8 BY MR. DAVIS:

9 Q Hello, Dr. Sandau. I'm Tim Davis. I
10 represent the petitioner, WildEarth Guardians. I
11 wanted to ask you about Page 10-0097 of your direct.
12 And this is where you state, "that 256 PFAS with CAS
13 registry numbers are commercially relevant, with other
14 rarer PFAS and hundreds of associated compounds
15 potentially occurring in the environment from
16 intermediate process"; is that your testimony?

17 A Yes.

18 Q Do you know how many of these PFAS have been
19 researched for toxicological effects out of the 256?

20 A I do not, no.

21 Q Do you know how many PFAS have been
22 researched, outside of the 256, for toxicological
23 effects?

24 A I don't understand the question. Outside
25 those 256 chemicals, have others been researched? I

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1 do not know.

2 Q Okay. Do you know -- out of that 256, do
3 you know how many have been used in oil and gas
4 operations?

5 A I do not.

6 Q Do you know if there's any way to find out
7 which of these have been used in New Mexico oil and
8 gas operations, if at all?

9 A You would have to look at the records
10 and -- and take measurements would be the way to find
11 out.

12 Q Okay. So I want to touch on, I think, two
13 parts of that answer. First, you're -- you said you
14 would have to look at records. Are you talking about
15 disclosures from the oil and gas industry?

16 A Yeah. Looking at -- I think we've talked
17 about those reports earlier in -- in the day about
18 different substances that had been looked at in the
19 oil and gas records. You can look at those and have
20 some idea of things that might have been used. And
21 then the -- the best way to do it is to measure.

22 Q And so when you talk about measuring, you're
23 talking about non-targeted testing?

24 A You could. If you wanted to screen for
25 everything that's there, you could try doing research

1 and doing non-targeted testing to figure out what
2 might be there, or targeted testing, which is, kind
3 of, what was done in those reports that were talked
4 about earlier.

5 Q So let's talk about non-targeted testing for
6 a moment. I think you said earlier -- first you
7 said -- you used the word "measure," and then I think
8 you then said "identify." And I want to make sure
9 that I understand that when you use non-targeted
10 testing, you are identifying something is there; some
11 substance may be present; is that correct?

12 A Yes. It will be a peak. A peak being -- we
13 make chromatographs. We do gas chromatographs or
14 liquid chromatographs, and we see a bump in there
15 which would represent a substance that's present.

16 Q And how would you go about identifying that
17 substance with a -- as a chemical, with a chemical
18 name, let's say even with a CAS number. How would you
19 do that from the blip to the identification?

20 A It's -- it's a multi-step process. I've
21 done it as a researcher, where you would, you know,
22 you -- you find this peak of interest. You don't know
23 what it is. You go, "Okay. I want to figure that
24 out."

25 So now you need to have a sample with that

1 blip in it, and you want to find a high -- high
2 concentration sample because the more that's there,
3 the easier it is to use some analytical techniques to
4 figure out what it is.

5 So let's say you've got a sample with a
6 large bump in it. You would -- the -- the go-to
7 technique is to use high resolution mass spectrometry.
8 What that does is it's -- it basically -- it's the DNA
9 makeup of the molecule.

10 It gives us what's called a molecular
11 formula, if you remember your chemistry classes, which
12 will basically give us this formula that you can try
13 to elucidate what the structure is. If you have a
14 high enough resolution mass spectrometry instrument,
15 you can actually define exactly what that molecular
16 formula is. And from that, we can try to figure out
17 what -- what the molecule might be.

18 Now, to conclusively identify it, you'd have
19 to propose what that chemical identity is, and then
20 you'd synthesize that chemical in a -- in a organic
21 chemical lab, and develop the standard. And then you
22 shoot the standard and shoot your sample, and say,
23 "Those match, therefore that is Chemical X."

24 Q That sounds complicated. So in doing the
25 non-targeted testing process, how certain can you be,

1 if you're trying to characterize a sample may contain
2 unknown compounds that appear as blips; right? How
3 certain can you be that once you've gone through the
4 whole process you just explained, that you've actually
5 characterized that sample accurately?

6 A You -- you went from characterizing a
7 chemical to characterizing a sample.

8 Q Yes. Let me clarify. Let's say that you
9 run that process multiple times in order to
10 characterize the sample. That's the question I'm
11 asking you. How accurate is that process for
12 characterizing multiple compounds which are unknown,
13 and then making them known to characterize the sample?

14 A I don't know if I can, still, answer that
15 question. If you're -- in non-targeted analysis, the
16 goal of non-targeted analysis is to -- is to screen
17 for stuff. And -- and then you -- you run multiple
18 samples and -- and see if it's common in all your
19 samples.

20 And then you would see how abundant it is in
21 those samples. And you don't necessarily have to
22 identify it to characterize it. You can say, "We
23 found this bump in 50 samples that we looked at
24 and -- out of 60." It's probably an important
25 chemical in those 60 samples, because it was found in

1 50 of them; right?

2 And you could do that for all the chemicals
3 that are in that sample. Maybe there's five or six or
4 20 chemicals that are common in all 50 of those
5 samples. Now you're starting to build a pattern of
6 chemical recognition where these unknown substances
7 are found in multiple samples. That's characterizing
8 a sample.

9 You still don't know what they are though.
10 And you can't conclusively determine what they are.
11 And we still don't have the capability to measure them
12 to the accuracy that we may need.

13 Q And on that point, that means then, when you
14 say "measure," you can't actually quantify through the
15 non-targeted testing methods; right? Can you quantify
16 a chemical through that process?

17 A We call it semi-quantitation in analytical
18 chemistry. It -- it has a -- it's a fuzzy number. So
19 you know, it could be -- say it's 50 plus or minus 50
20 percent; right? So that's all you can say when you've
21 got that kind of semi-quantifiable numbers

22 And when you're -- when you're doing
23 these -- when you're analyzing these samples, when you
24 say semi-quantitative, it's just not to the precision
25 and accuracy that we probably want in most

1 circumstances.

2 Q And so then, if we move to targeted testing
3 methods, this would be a situation in which you know
4 what you're looking for?

5 A Yes. You -- well, yeah. You would -- you
6 would pick targets based on what you expect to find.
7 Absolutely.

8 Q And if you find what you expect to find, you
9 could quantify it?

10 A Yes.

11 Q And so if you had two samples, and you knew
12 what was in Sample A, you could run targeted testing
13 methods to quantify the constituents of Sample A?

14 A If they were part of the routine methods,
15 and we had the standards for them, yes.

16 Q And would Sample B -- if you did not know
17 what was in sample B, you couldn't -- you would have
18 to start with non-targeted analysis?

19 A Not necessarily. But you -- you could run
20 targeted analysis to see if there are some common
21 structures there, so you had quantitative numbers on
22 the things that you could quantify. The non-targeted
23 analysis just provides you extra information on what
24 might be there.

25 Q And so let's assume Sample A and Sample B

1 each contain the exact same number of components.
2 Sample A used targeted testing because you knew what
3 you were looking for. Sample B, you used a non-
4 targeted analysis, or you use a targeted analysis and
5 didn't know what you were looking for.

6 Would you be more confident that you were
7 able to identify all the compounds and quantify them
8 in the Sample A, which used a targeted analysis, or
9 Sample B, which, again, Sample B is the sample where
10 you don't know what's in it?

11 A I think we're -- we're confusing the issue
12 here a little bit of -- of what's in Sample A, what's
13 in Sample B. Targeted analysis provides us
14 quantitative data on say, the 40 things that are
15 there. And we're only quantifying the 40 things.

16 If there's 50 things, we're not looking at
17 those other ten; right? So we know what's in Sample A
18 and Sample B based on targeted analysis, because we
19 are measuring for those 40 things and getting numbers
20 for those 40 things.

21 The non-targeted analysis, all it's going to
22 tell us is that there's ten other things there.

23 Q And we don't know what they are?

24 A We won't know what they are.

25 Q So if your sample -- let's say that there's

1 disclosure of what is present in a sample, would you
2 be more confident that you could find out -- you could
3 use targeted analysis to confirm that those are in
4 fact in that sample, or maybe not, but - and also
5 quantify what you do find?

6 A No, and I'll caveat that. So the situation
7 that I think you're presenting here is, say there's a
8 disclosure and there's a new chemical that's not in
9 the 40 that we're measuring. And it -- it's disclosed
10 as being used.

11 And then we run samples where that chemical
12 could be present, and we find an unknown peak that
13 happens to be there, and we get a mass spectrometry of
14 that thing, and the molecular weight happens to match
15 the known thing that was put in there.

16 You're starting to build a case that the
17 chemical that is disclosed is in your sample. But you
18 have -- still have to prove that; right? So -- but
19 you're starting to get a line of evidence that
20 demonstrates that the thing that was -- that you
21 should -- that -- that was disclosed is actually in
22 your sample.

23 Q Maybe this question will follow up -- well,
24 in this line of questioning, I believe is -- you
25 talked about, kind of, building that case. That is an

1 easier proposition to do with disclosure of what's in
2 the sample on the front end?

3 A It's -- it -- you know, I do these chemistry
4 things all the time. If we know what the source looks
5 like, it's easier to find the source.

6 Q Thank you. Sorry it took me so long to get
7 there. In your direct testimony, you also state that
8 knowing how ubiquitous PFAS chemicals are, these
9 levels reflect there is no level of exposure to these
10 contaminants without risk of health impacts?

11 A That was there, yes.

12 Q Are you referring to the 256 commercially
13 relevant PFAS compounds with CAS numbers here?

14 A It -- it's probably the -- the ones that are
15 routinely measured, which would be even a reduced list
16 of that 256.

17 Q So the ones that are unsafe at any level of
18 exposure are the ones that have been studied?

19 A The ones that are part of those routine
20 methods are most studied, are the most well-defined.
21 We know where their uses are, and that's why they've
22 been incorporated into those routine methods because
23 we find them more often.

24 Q How many PFAS compounds would fall into that
25 category?

1 A The ones that we know of. So the -- the 40
2 to 70 that we routinely measure.

3 Q Okay. So the 40 to 70 are the ones that we
4 have sufficient data on to determine that there's no
5 safe level of exposure?

6 A A bit of an overstatement.
7 It's -- the -- those 40 to 70 are the ones we
8 routinely monitor, have -- have had regulatory limits
9 put on some of them. So it is -- it's the -- the ones
10 that are toxicologically relevant have the limits that
11 are associated with them.

12 We're -- not all 40 or 70 of them have
13 limits. They -- they've been included in the
14 methodology because they're
15 still -- they're -- they're abundant in the
16 environment, and we feel that we should continue to
17 watch them, and they're incorporated in those
18 methodologies. They may not have the regulatory
19 limits associated with them.

20 Q But you would agree we don't actually have
21 enough data to know that at this point?

22 A That, what?

23 Q We don't have enough data to know that they
24 are as toxicologically problematic as the ones we do
25 have data on?

1 A You should ask the toxicologist on that so
2 they'll be more -- more readily able to answer a
3 question like that, because I -- I don't know if all
4 40 have all the toxicological data to make that
5 statement.

6 Q Fair enough. Do we know if these PFAS
7 compounds -- so not a single compound, but the
8 compounds together could create additive toxicity?

9 A I think there's certain families of PFAS,
10 small families, that would have similar toxicological
11 endpoints because they're similar in structure. But
12 not all PFAS have the same toxicological response, and
13 not all PFAS are going to have additive toxicology.

14 Q So for those that you just stated, because
15 they have similar properties may create additive
16 toxicity, are those all covered in the 40 to 70 PFAS
17 that are detectable by EPA standard analytical
18 methods?

19 A I -- I don't know for sure, but that's where
20 the majority of the tox data's going to lie is in
21 those 40. They are the most common and the most well
22 studied.

23 Q I believe your testimony was that the
24 definition that's been proposed -- and I was -- when I
25 was prepping for this, I was calling it the Wang, et

1 al. definition, but I understand that is the OECD
2 definition, with the caveat that you testified to in
3 rebuttal; is that accurate?

4 A Yeah. Wang is a -- University of Zurich,
5 and he's part of the OECD. So they wrote that as an
6 organization, and then he wanted to put that out into
7 the scientific literature.

8 Q My understanding of your testimony regarding
9 that definition is that it's -- the definition that is
10 limited right now by what can be tested for using EPA
11 standard analytical methods. But it will grow as
12 those standard analytical methods develop?

13 A Yes. I suspect it will.

14 Q So there's nothing -- I mean, preface this
15 with -- are you familiar with the definition that was
16 proposed by WildEarth Guardians in this matter?

17 A You remind me, but yes. I'm --

18 Q It's a definition that -- it defines PFAS as
19 one -- any compound with one fully fluorinated carbon
20 atom. If The Commission were to adopt that
21 definition, there's nothing that, by adopting that
22 definition, that would impede the standard analytical
23 methods to continue to grow; correct?

24 A I don't think that definition has any impact
25 on EPA methods.

1 Q And as that definition -- as the Wang, et
2 al. definition grows due to the growth in standard
3 analytical methods, is it possible that there will be
4 some single fully fluorinated carbon atom compounds
5 that are not encompassed in the 40 to 70 that will be
6 covered by that definition, but that will later be
7 covered by the Wang, et al. definition? I can
8 rephrase that if you need me to.

9 A Please.

10 Q Sure. So right now, we have 40 to 70 PFAS
11 compounds that would be covered by the Wang, et al.
12 definition; correct?

13 A Yes.

14 Q And there are thousands of other compounds
15 that would fit under a single fully fluorinated carbon
16 atom definition; correct?

17 A Yes.

18 Q And so as the definition -- the Wang, et al.
19 definition grows with testing methods, it would start
20 to cover some of the compounds that would be included
21 under the WildEarth Guardians' proposed definition;
22 correct?

23 A It would, but you have to read the Wang
24 definition and the rationale for why they defined it
25 that way. It was to exclude chemicals that should not

1 be a part of the PFAS family based on their
2 chemistries.

3 And the -- and so there's some rationale
4 there on why they wanted to restrict it to being a
5 fully chlorinated [sic] methyl or a fully chlorinated
6 [sic] methyl carbon so that certain chemicals were
7 excluded and certain chemicals were included in -- the
8 definition as it was stated previously, which was two
9 carbons in a row that had to be fluorinated; right?

10 So I -- yeah -- you have to read the -- the
11 Wang and the OECD rationale on why they went with that
12 definition. The -- the WildEarth Guardians'
13 definition ignores that part, those rationale that
14 Wang used.

15 And what it does is it just -- it -- it
16 sucks in a lot of chemicals that would never be
17 classified as a PFAS for the chemistry, and the
18 chemists that are -- were deciding on -- on what is a
19 PFAS and why is it a PFAS.

20 Q The chemists who are making that decision to
21 define PFAS in the Wang, et al. scope of the
22 definition, that definition was not arrived upon in
23 consideration of toxicological data, was it?

24 A No. It's a chemistry decision.

25 Q One last topic I wanted to cover with you is

1 something you said on rebuttal. And tell me if
2 I'm -- I don't have it in front of me; I don't have it
3 written anywhere, so I want to make sure that I'm
4 rephrasing this correctly to you.

5 But the drinking water limits in parts per
6 trillion, I think your testimony was that we shouldn't
7 think of that necessarily as the limit of toxicity; is
8 that correct?

9 A Somewhat. Yeah. I was -- just because
10 they're that low, don't assume that all chemicals are
11 toxic at that level.

12 Q So when you say all chemicals, do you mean
13 all PFAS?

14 A Yes. At that level, yeah, as we're
15 referring to PFAS as we described.

16 Q So the PFAS for which we do have
17 toxicological limits in the parts per trillion, those
18 are toxicological limits for that compound?

19 A Again, probably a question you should ask
20 the toxicologists that are coming up after me, to
21 define what those toxicological endpoints are and how
22 relevant they are to the guidelines as they were
23 derived.

24 MR. DAVIS: Okay. I have no further
25 questions. Thank you.

1 HEARING OFFICER: Okay. Thank you,
2 Mr. Davis.

3 Let me turn to the chair.

4 Mr. Chair, do you have questions of
5 Dr. Sandau?

6 MR. RAZATOS: I do.

7 CROSS-EXAMINATION

8 BY MR. RAZATOS:

9 Q Thank you, Doctor, for your testimony.
10 Appreciate it. Quick question for you. I appreciate
11 you described for us the difference between analytical
12 screening, targeted and non-targeted. Do you know
13 if -- samples that go to the EPA standards are -- do
14 they start off with a analytical screening first and
15 then go to a targeted, or do they go straight to the
16 targeted?

17 A Most samples that are being analyzed will go
18 straight to targeted. Because it's -- it's, sort of,
19 off the shelf. You can go into the store and buy
20 them; right?

21 Q Okay. Just making sure that I understood
22 that correctly. Now, method 533, method 537.1, and
23 method 8327 are definitely targeted analysis; correct?

24 A Yeah. And -- and 1633 as well.

25 Q And 1633. Sorry. I didn't go far enough to

1 look down. My apologies. Now, the targeted analyses
2 look for specific compounds; they're slated for
3 specific compounds. Could they -- could there be
4 other blips on these chromatogram as they come off of
5 the machine? Or are we just looking at 70, and that's
6 it; there's no other blips on the chromatograms?

7 A Depends how good your analytical lab is.
8 There will be -- there could be other blips that show
9 up in the lab. If they're just reporting stuff and
10 you're not looking at the chromatograms as a purchaser
11 of that service, you won't notice the blips. The lab
12 won't report the blips.

13 If -- if you then -- if -- if I -- if I'm
14 doing a -- a scrutiny of data, and I see a blip, and
15 it's important to me, I could ask the lab, "Hey.
16 What's that other thing that's beside the chemical
17 that we measured?" And they would probably be able to
18 try to help me figure out what it might be.

19 So those blips might be present, but they're
20 likely not going to get reported in a routine setting.

21 Q Okay. And another question that, kind of,
22 came up with Mr. Davis's questions, when a laboratory
23 is looking at blips and they say, "Ooh. This one was
24 in 40 of my 50 samples," and you start figuring out
25 what this blip was, how are you assuring it, after you

1 say it's Compound X, whatever X is, that -- when you
2 go from just a screening to a targeted, how are you
3 assuring that this is what we're reporting is correct?
4 Could you, kind of, go into that step for us?

5 A Sure. I -- this happened in my thesis. I
6 was measuring metabolites in polar bears, and there's
7 this great big peak. It was the biggest thing in the
8 chromatogram. I was measuring all this other stuff,
9 and the big peak was there, and I'm like, "What the
10 heck is this big thing that's there? I should
11 probably identify it since I'm measuring this -- this
12 chemical mixture."

13 And so that's what I had to do is I measured
14 it, and it was in all the polar bear samples, and it
15 was the biggest thing there. I'm like, "Okay." So I
16 went through the process that we described. That's
17 why I was able to describe it so nicely, because I've
18 been through it, and wrote on it paper. Nobody's read
19 it though; it's a very -- not well-cited paper.

20 Anyway --

21 Q There's a plug for your paper.

22 A Yeah. So if anybody wants to read about
23 polar bear plasma.

24 Anyway, so you find it, it's interesting,
25 it's in your samples. You're like, "Okay. As a

1 researcher, I need to identify it." So you -- you go
2 to your -- your tools that are available. And so
3 I -- I have to take a liter of polar bear blood and
4 extract it, and -- and extract it down so that I could
5 inject it on this highly specified instrument that's
6 called a high resolution mass spectrometer.

7 And so I needed it at very high
8 concentrations at the time, because it was, you
9 know, a while ago -- I won't age myself. And -- and
10 then we got a high resolution mass spectra of that
11 substance. And that gave me the molecular formula of
12 it. So I knew what its chemical structure was.

13 And as a chemist, you can, sort of, put the
14 building blocks together on how it fragments, and what
15 the molecular weight is, to identify, kind of, what it
16 is. And then I had a lab synthesize what I thought it
17 was, and spent -- they spent -- we spent money, and
18 they spent their time, and they synthesized that
19 chemical.

20 And then they -- we bought -- bought it off
21 of them, and I injected it with the polar bear blood.
22 And I could see that that was the exact chemical. It
23 came out -- that blip came out at the exact same place
24 where that synthesized standard came.

25 So then I could confirm that that was the

1 chemical. Now that I've done that, I've identified
2 it, I've given it a name, I've given it a CAS number.
3 I can then say, "Okay. Those 50 samples that I
4 measured, I can go back and then quantify all of them
5 to say the chemical is this concentration in all the
6 samples that I ran previously."

7 Q Okay. And so that -- now we're on the
8 quantification part of it, how are you doing quality
9 assurance and quality control for that?

10 A For that, it -- it would have to go through
11 the same process of -- in -- in that particular
12 instance, I'd have to re-extract those samples to make
13 sure that they're going through the exact analytical
14 process in order to accurately quantify that there's
15 that substance in it.

16 So the QA/QC is you would make a -- a
17 calibration curve with that new chemical. You would
18 extract your samples and have a recovery standard that
19 would tell us how -- that you -- you got the chemical
20 out of your process.

21 And then you'd run your sample with those
22 calibration curves samples to quantify the exact
23 amount that was found in each sample.

24 Q So is it fair to say that these methods that
25 the EPA is using have basically followed that basic

1 protocol to where, right now, we have a targeted
2 result coming out of the EPA standard?

3 A Correct. And -- and with the EPA methods,
4 they, they go a step further. They define all the
5 QA/QC materials you should have. You have to have
6 this many blanks, and you have to have a lab blank,
7 and you have to have a -- a, you know, an instrument
8 blank.

9 And they -- they put all these other
10 qualifiers in there to know that the method is valid,
11 that the -- the instrument's working, the way you say
12 it is, it's measuring the same thing at the same
13 concentration over periods of time.

14 That's all built into that as well. And
15 then that method also defines how much wiggle it's
16 allowed before you say, "The lab's not working. Let's
17 recalibrate and run those again."

18 Q Sure. Okay. Thank you for that. Just when
19 we're looking at testing, it was thrown out that 4
20 parts per trillion and 10 parts per trillion, or 4
21 nanograms per liter and 10 nanograms per liter; when
22 we're talking about this, and I realize you said
23 you're not a toxicologist, so I'll definitely ask the
24 toxicologist further on this, but does that basically
25 mean that you're reporting at that lower level?

1 Is that a lower limit of detection for the
2 instrument? Yes? No? All of the above? Something
3 of that extent?

4 A The analytical labs will all shoot to have
5 at least a tenfold safety margin. So if the limit
6 is 4, they're going to have 0.4 as their detection
7 limit so that they can quantify that number to the
8 degree of accuracy and precision that they want.

9 So the lab is actually able to go to 0.4 --

10 Q Even further?

11 A And yeah, they'll go even further. So that,
12 again, if -- if you're right at detection limit,
13 sometimes you'd see it, sometimes you wouldn't, and it
14 gets caught up in the noise.

15 So analytical labs will always want to have
16 that safety margin, which is usually ten, but this
17 low, it may be five. But they're going to have a
18 factor of safety so that they know that when they
19 detect 4, they know it's 4.

20 Q Okay. Excellent. So with the OECD
21 definition, kind of, going with Mr. Davis's question
22 about a single carbon that's been fluorinated,
23 the -- does the OECD definition encompass a single
24 fluorinated carbon as well?

25 A It -- it does. I think the question needs

1 to be flipped. The OE -- the -- the definition that
2 we've -- we supplied is consistent with what the
3 scientific literature considers a PFAS. And it
4 was -- it was derived based on the OECD guidelines on
5 chemicals that were getting screened in as PFAS that
6 shouldn't, and chemicals that were screened out as
7 PFAS, although they shouldn't -- they -- they should
8 be.

9 And so the OECD one, the -- the European one
10 and -- and well, north America is part of it too; it's
11 not just European -- that was to define chemistry-wise
12 what a PFAS molecule is. The -- the Wang one,
13 it -- it broadens it. So now it's just anything
14 that's a fully fluorinated carbon could be in.

15 And that sucks in millions of other
16 chemicals that could be then classified as a PFAS;
17 right? So it -- it -- using the OECD one limits the
18 scope of what a PFAS chemical is to -- to what the
19 accepted definition is by the scientific community.

20 Q Okay. Thank you. And the question had come
21 up, and I don't remember who asked the question, about
22 the OCD records and the testing that was potentially
23 done on there. Were you able to review any of those
24 records yourself?

25 A OECD records?

1 Q No. It the OCD, Oil Conservation Division.

2 A Which -- which records are these again?

3 Q It had come up that there was testing
4 records that the New Mexico Oil Conservation Division
5 had. Were you able to review any of those records
6 yourself?

7 A Is that part of the Chang study, or was it
8 just --

9 Q No, no, sir. It's our -- the personal
10 records of the State.

11 A Okay. Yeah. No, I have not reviewed those.
12 No.

13 DR. SANDAU: And I have no further
14 questions. Thank you.

15 HEARING OFFICER: Thank you.

16 Commissioner Bloom?

17 CROSS-EXAMINATION

18 BY MR. BLOOM:

19 Q All right. Thank you, Dr. Sandau. I have
20 one burning question. What was that substance in the
21 polar bear blood?

22 A It was 4-hydroxyheptachlorostyrene, which
23 was a metabolite of octachlorostyrene. And polar
24 bears had an innate ability to chew on
25 octachlorostyrene and accumulate that particular

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1 metabolite.

2 Q Oh. Who knew. Thank you.

3 A Now it's on the public record, I'm sure I'll
4 get a couple more citations.

5 Q We hope so. We can only hope so. So
6 backing out a little bit from testing regimens, you
7 know, at the end of the day we're up here as OCC
8 commissioners, regulators, administrators, and we're
9 charged with doing a couple of things.

10 One of which is protecting public health and
11 the environment. And I would say perhaps another one
12 is creating an enforcement capability. And depending
13 on definition, some of these things are easier than
14 others.

15 If our definition of PFAS is what the
16 proponents put forth, which, if I can say this
17 correctly, it's a fully fluorinated carbon atom?

18 A Correct.

19 Q Okay. And then that would be a standard
20 which would ban potentially thousands of PFAS or more;
21 is that correct?

22 A Hundreds of thousands if not millions.

23 Q Okay. Hundreds of thousands, if not
24 millions. So that would -- and based on what we've
25 learned about the toxicity of PFAS, and how few of

1 them have been tested, that would create a very
2 comprehensive way to protect public health; does that
3 seem fair?

4 A It -- it would cover pretty much anything
5 that's fully fluorinated. So you're -- that's a big
6 blanket that's been thrown.

7 Q And then the smaller subset is one of -- was
8 it 40 to 70 chemicals that your definition would
9 cover?

10 A As it's defined now by the analytical
11 methods that are currently in practice.

12 Q Okay. And I don't know; this might be a
13 question more suited for Mr. Powell, but why does the
14 OCD need these two circles to be the same size, one
15 which is protecting public health, which would be 40
16 to 70 chemicals, would be the only ones that we would
17 be guarding against, and then the enforcement being
18 the same thing.

19 I feel like we could have -- we could ban
20 other chemicals that we can't currently enforce
21 against, and the ban protects public health. Later,
22 perhaps, as the testing capabilities grow, which you
23 talked about, we'd be able to enforce more of that.

24 But at first, we would protect, and then
25 later look at a growing enforcement, kind of, growing

1 that smaller circle out to match the larger one
2 covered by the more comprehensive definition. Any
3 reaction to that?

4 A Well, I -- I think there's -- a little
5 nuance in the -- in the definition of PFAS is -- is
6 also deliberately added as well. I think that that
7 we -- we haven't talked about that, but that's
8 something -- if PFAS is ubiquitous, and it's found in
9 water, and an oil company uses ground water that has
10 a -- a PFAS that's not theirs, but they put in the
11 water, is that part of this; right?

12 Like, I think that's still a component. So
13 other stuff not deliberately added is also part of
14 what the plaintiffs are going for; right -- the
15 proponents are going for. So consider that as well.
16 The -- most of these chemicals are scientific
17 curiosities at best. They're not relevant.

18 And -- and I know when I -- I think we, as
19 scientists, we haven't done our job communicating
20 clearly on PFAS, and -- and a lot of other -- other
21 science as well. But let's just talk about PFAS.
22 They're scary to everybody. And when you read the
23 internet, everything's scary, and big, and many.

24 Most of these chemicals have no use. We're
25 never going to see them. A million chemicals, there's

1 no reason to ban a million chemicals that we don't
2 even know what they're used for. It's, kind of, where
3 limiting it to things that are measurable, that are
4 relevant, to methods that will continue to -- to
5 incorporate things that are measurable and relevant.

6 You're not limiting it. You're just keeping
7 it to a realm of -- of -- that's -- that's enforceable
8 and usable on a day-to-day basis. We've talked -- I
9 think you -- The Commission has heard about
10 disclosure.

11 If there is a leak, there is going to be
12 disclosure, and we are going to be able to look for
13 other things and they are going to be measurable. So
14 I know that's an extreme event where we're now
15 measuring for a release, but it doesn't preclude us
16 from looking for other things outside those 70.

17 So you know, keeping it manageable and
18 enforceable, I think, is an important part of, of what
19 this group needs to -- to figure out how they're going
20 to do that, and still grow with the science that's
21 coming and not pigeonhole it to a definition right now
22 that limits it to ten things or the forty things that
23 are in 1633.

24 Q So I think we're probably in agreement that
25 under current -- under TOSCA and other testing

1 regimes, we've only done safety testing on a very
2 small percentage of PFAS chemicals; correct?

3 A Yes.

4 Q The oil and gas industry's known for being
5 incredibly innovative. We have certainly seen that
6 over the past -- well, over the course of its history
7 and certainly the last 20 years in many ways; right?
8 Good and bad, I suppose.

9 Is there any -- would you have any concerns
10 that we outlaw or ban 40 or 70 chemicals and then ones
11 that look to be related that haven't been safety
12 tested are suddenly in use?

13 A With the focus on PFAS right now, if oil and
14 gas companies going to be innovative and use a
15 chemical that might even look like a PFAS, I think
16 that would be, kind of, silly. That doesn't mean it's
17 going to prevent it, that's for sure. But, you know,
18 with focus on it now, I -- I can't imagine an oil
19 company's going to want to do that.

20 But that being said, are they using
21 substances that -- that might be banned in the future?
22 I think, you know, we live in a chemical industry that
23 has innovation and -- and to -- to think that we are
24 going to -- is this -- are we going to be smart enough
25 to include everything and protect against all

1 substances? I -- I don't think we can do that without
2 some ability to enforce it.

3 And -- and that was the trouble of trying to
4 work on this project, is how do you come up with
5 a -- a definition that is encompassing and enforceable
6 and -- and that's, sort of, where we landed and -- and
7 why we were -- we, sort of, stuck with the definition
8 that we provided.

9 MR. BLOOM: All right. Dr. Sandau,
10 thank you. No further questions. Appreciate your
11 time today.

12 HEARING OFFICER: Thank you.

13 Commissioner Ampomah?

14 DR. AMPOMAH: Okay. I do have
15 some -- few questions.

16 CROSS-EXAMINATION

17 BY DR. AMPOMAH:

18 Q I want to take it off from where my other
19 commissioners left off. So assuming work that is
20 what -- of guidance definition, we are looking at over
21 millions of components that even probably we don't
22 know all of them, as of now.

23 Now, based on NMOCD's definition, it is
24 about 40 to 70 components that covers that definition.
25 Now, then I presume that OCD's definition is going to

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1 be more less classified as dynamic; is that correct?

2 A I would say responsive or dynamic. Yeah.
3 Like, as the science grows, and those methods expand,
4 so will that definition of what is monitored.

5 Q And do you see that as being fair to all
6 parties involved, especially, like, let's say, the oil
7 and gas industry?

8 A Well, I -- I think everybody's coming from
9 their angle; right? I think it's fair to the oil and
10 gas industry because they know what playing field
11 they're dealing with, or what substances they have to
12 worry about.

13 I don't think the public's going to feel
14 particularly happy about it because they're -- they're
15 not going to feel protected, because all the
16 scientists I've done is talked about the thousands of
17 chemicals that are out there.

18 So you know, fair depends on who you are.
19 There's going to be an objection -- it's -- from one
20 of them for -- for, you know, how we define it.

21 Q Yeah. Because I do have -- like, if you
22 look at this analogy, and let's say Time T is equal to
23 zero now, we are looking at 40 to 70 compounds; right?
24 And that is getting, more and less, into the
25 intentional use and non-intentional use, which I'll

1 come to that.

2 Now, you do have a company staying away from
3 the 40 to 70 compounds, but they are using some other
4 components that were, more or less, at Time T is equal
5 to 20, we find out that this one also belongs to the
6 PFAS components; right?

7 So I think there has to be a balance on the
8 definition. Other than that, then, is a company
9 liable at that time, T is equal to 20, or not? You
10 know, so that gets into intentional use and then
11 unintentional use. So I don't know if you have any
12 comment on that?

13 A Well, I -- I think the intentional use and
14 the non-intentional use is an important thing of -- of
15 especially to -- to be, I guess, responsible for
16 co-contaminants in water that you could test for or
17 don't know about. That -- that's hard for
18 any -- like, they would -- it -- it's -- it's arduous
19 on them to be able to know what was inadvertently
20 present; right?

21 So I -- I think that's not fair to
22 the -- the oil and gas companies or -- or for the
23 government organizations in enforcement to -- to
24 regulate something that we don't know is there.

25 I -- comment on -- I diverted myself there.

1 What was the other part of the question? It was --

2 Q No. I think -- so I'm just -- I just
3 pointed out that at least there has to be a balance --

4 A Right.

5 Q -- you know, with regards to the chemicals
6 that we're dealing with. Because, like, let's say if
7 it is millions of compounds, how is even the regulator
8 going to regulate that; right?

9 A I -- I think it's an near impossible task.
10 But remember that the chemicals we're measuring are
11 the ones that are relevant. It -- it's like, there
12 are thousands of scientists worldwide studying the
13 presence of PFAS in the environment; thousands of
14 them, non-targeted, targeted, selected analysis.

15 We -- the scientific community is looking
16 for everything, anything they can find, because
17 it's -- it's relevant to society, right now. We are
18 going to discover those -- to -- for an oil company to
19 find a secret ingredient that's never been looked at
20 before, and put it in a formulation, I think is -- I
21 think you're -- I think we're putting a little too
22 much cred on -- on oil companies finding -- finding
23 those kind of things; right?

24 Like, like, literally, there's -- you're not
25 going to be able to regulate all of them. And we have

1 to rely on what we can measure and know that's out
2 there. And I think that our definition allows us to
3 grow as it grows.

4 And yes, they are going to be -- I guess,
5 what you -- what -- not a question for you, because I
6 shouldn't ask you questions, but if -- if this method
7 grows to 100 chemicals in five years, the company used
8 it today, I think they are responsible for it.

9 Q Well, so I do have that question for NMOCD,
10 because that goes into the intentional, and then
11 unintentional use as well, you know, because let's say
12 at T is equal to 20, at that time, they didn't know
13 that this was a toxic chemical, or it was not part of
14 the 40, 70 chemicals, but they used it anyway; who is
15 responsible for that?

16 A Yeah. Again, this -- and we're defining
17 PFAS that's going to include thousands of chemicals.
18 So that would mean that the oil and gas would have to
19 find a chemical that doesn't get defined in that
20 definition, that -- where -- where maybe the -- the
21 WildEarth Guardians' one would have caught it; right?

22 And you know, that's -- that's a lot of
23 theoretical -- and I -- I -- that doesn't seem
24 plausible to me. Possible, but maybe not plausible.

25 Q You know, based on your experience, can you

1 at least guide The Commissioner a little bit on the
2 intentional and then unintentional use of, let's say,
3 a chemical, you know, and I've seen in some of the
4 proposal from NMOGA, they want to add intentional
5 added PFAS. And I do know NMOCD's position is not;
6 right? So can you comment on that?

7 A Yeah. I -- that's a decision that needs to
8 be made, and it is important, with the water systems
9 having PFAS almost present in most water samples.
10 Most groundwater -- I think it's 60 or 70 percent of
11 groundwater samples in the US have a PFAS in them -- a
12 PFAS. River systems, probably about the same.

13 So if you're taking surface water or
14 groundwater as part of your industrial process, you
15 are putting a PFAS into that process. Could be very
16 little levels, but you're incorporating it in there;
17 right?

18 You've used groundwater or river water that
19 has a monitorable amount of PFAS in it, and you're
20 using it to -- as a deliverant, or, you know, as -- as
21 your -- your base water for whatever you're doing on,
22 on the oil and gas site.

23 Was that intentionally added? Well, you
24 intentionally added the water. You weren't -- you
25 weren't adding the PFAS for any specific purpose. So

1 now, is it the oil and gas's -- company's job to
2 filter and treat all water before it uses it for a
3 downhole, or whatever use?

4 Or are they able to use the -- the water
5 that's around them, and -- and use it in -- in their
6 particular application?

7 Q Yeah. I hope NMOCD is thinking about this,
8 because -- yeah. I will ask that anyway.

9 A So then, are you suggesting that, at least,
10 companies has to, more or less, test, which I know
11 that, you know, as part of the process, if you're
12 going to do separate test, or even any injection, the
13 regulator requires to know the composition of the
14 water that you are going to use.

15 So is it, more or less, going to be part of
16 it, like, in terms of companies need to, more or less,
17 look at the composition -- full composition of the
18 water that they are going to use for their operations,
19 to, more or less, be able to respond to whether it was
20 intentional or unintentional?

21 Q Well, like, I -- I think by keeping the
22 analytical chemistry manageable, I think that allows
23 them to test better; right? Like, if they know they
24 have to monitor for 70 things, maybe they will. And
25 it becomes part of the routine of them testing for

1 those 70 chemicals, because they know that they may be
2 liable for using them in the process.

3 If you say it's all million chemicals that
4 they're liable for, that makes the testing impossible.
5 So you know, I -- I think it's about being manageable
6 and -- and -- so that they -- they're able to do what
7 you're asking them to do.

8 And -- and what they're going to have to
9 struggle with is what is background and, like, it,
10 like, if you, you know, if you take water downstream
11 from a firefighting foam facility, that's probably not
12 the best water to use for your downhole injection, or
13 whatever you use it for.

14 If you're taking regular river water that
15 has just background levels, maybe that's okay. But,
16 you know, that's -- that's for the decision makers to
17 make. But having tangible analytical chemistry that
18 they can wrap their hands around and understand, I
19 think is -- is the crux of -- of what we need to do so
20 that we know what game we're playing.

21 DR. AMPOMAH: Thank you, sir.

22 HEARING OFFICER: Thank you.

23 All right. Let me ask if there's any
24 reason not to excuse Dr. Sandau at this point.

25 No?

1 All right. Thank you very much for
2 your testimony, Dr. Sandau. I loved the bit about the
3 polar bears.

4 All right. I think this is a good time
5 for a break, because 15 minutes brings us back at two
6 hours since lunch. Then we can go to your next
7 witness. 2:30.

8 (Off the record.)

9 HEARING OFFICER: All righty. We are
10 back after a short break between Division witnesses.

11 Mr. Tremaine?

12 MR. TREMAINE: Thank you. The Oil
13 Conservation Division would call Dr. Erik Martin.

14 HEARING OFFICER: Dr. Martin, do you
15 swear or affirm to tell the truth?

16 DR. MARTIN: I do, yes.

17 HEARING OFFICER: Thank you.

18 Go ahead.

19 DIRECT EXAMINATION

20 BY MR. TREMAINE:

21 Q Good afternoon, Dr. Martin. Thank you for
22 being here. I want to start off by asking you if you
23 have prepared a Curriculum Vitae to submit to The
24 Commission in preparation for this hearing?

25 A Yes, I have.

1 Q And is that represented in OCD Exhibit
2 Number 7?

3 (OCD Exhibit 7 was marked for
4 identification.)

5 A Yes, it is.

6 Q And did you also prepare pre-filed written
7 testimony, and is that represented in Exhibit
8 Number 9?

9 (OCD Exhibit 9 was marked for
10 identification.)

11 A Yeah, that's correct.

12 Q Do you need to make any changes or
13 clarifications to the content of that direct
14 testimony?

15 A No, I do not.

16 Q And today, do you affirm and adopt that
17 direct testimony as that's true and accurate?

18 A Yes, I do.

19 MR. TREMAINE: At this time, Madam
20 Hearing Examiner, I would offer -- request to admit
21 OCD Exhibits 7 and 9.

22 HEARING OFFICER: Okay. Let me pause a
23 moment in the event there are objections.

24 Exhibits 7 and 9 are admitted.

25 (OCD Exhibit 7 and Exhibit 9 were

1 received into evidence.)

2 BY MR. TREMAINE:

3 Q Dr. Martin, would you be so kind as to
4 provide a brief, no longer than three-minute summary
5 of your pre-filed direct testimony for The Commission?

6 A Sure. Yeah. I'll be nice and quick.

7 Essentially, I was brought into help develop
8 a definition for -- for PFAS with Dr. Sandau. I was
9 primarily involved with, you know, just some of the,
10 kind of, research that went behind that, just trying
11 to find all the various definitions out there.

12 There are in many, many out there, as I
13 think most of us are aware of. So yeah, I mean,
14 ultimately, yeah, we came up with our -- our
15 definition that we, kind of, all agreed on.

16 Dr. Sandau did have final say on what that
17 definition was, given that he's the analytical chemist
18 here. I was essentially, you know, part of the team
19 to provide any toxicological expertise that might be
20 required with respect to PFAS. So yeah. That's --

21 Q And in your professional opinion, I mean,
22 did you agree with the ultimate proposal of the
23 definition submitted and proposed by OCD?

24 A Yes, I did.

25 MR. TREMAINE: Madam Hearing Officer, I

1 did have a couple rebuttal questions for Dr. Martin.
2 We have not submitted notice of that intent. I don't
3 believe that that's strictly required by the rules, so
4 I would ask to proceed with just a few, much less
5 extensive than I have for Dr. Sandau.

6 HEARING OFFICER: All right. Thank
7 you. Go ahead.

8 BY MR. TREMAINE:

9 Q Okay. Dr. Martin, I want to -- we've heard
10 a -- I think, quite a bit of discussion about, you
11 know, the chemical or chemistry definition of PFAS,
12 and discussions through some of the testimony and the
13 questions about how those different definitions may or
14 may not relate to the toxicity of different PFAS
15 compounds.

16 So I want to start with the rebuttal
17 exhibit. Have you reviewed the rebuttal testimony
18 from New Energy Economy submitted by Dr. Hansen?

19 A Yes. I believe I read that this morning.

20 Q Okay. Would you agree with the statement
21 that all PFAS are toxic?

22 A No. That is -- that's definitely not
23 correct. I mean, given this large, vast expanse of
24 chemicals that we're talking about, obviously we're
25 looking at chemicals that have got majorly different,

1 kind of, chemical groups. And, I mean, they just
2 don't anything like each other.

3 Very big differences in some of them with
4 respect to, you know, physical chemical properties.
5 And some of these chemicals are known to be inert. So
6 I mean, they're certainly not all, you know, they
7 certainly don't all have potential to cause toxicity.

8 Q Okay. And how would you respond to the -- a
9 general statement that the impacts of PFAS from a
10 toxicological perspective are additive?

11 A Again, given that, you know, talking about
12 the entire PFAS universe, then I mean, that statement
13 is -- again, it's not correct. Again, given the vast
14 differences in some of these chemicals, vast
15 differences in physical chemical properties, for sure,
16 they're not going to have -- if you're assuming
17 something is additive, then you're essentially
18 assuming that they're going to have the same mode of
19 action.

20 And that's just not going to be the case
21 with these chemicals that are extremely varied.
22 And -- and that's not to say that a small subset -- I
23 mean, we definitely don't know the answer to this, but
24 for sure a -- a small subset of these chemicals could
25 potentially have additive effects.

1 Q Okay. I think you just answered my
2 clarifying question, which was would you agree that
3 certain PFAS compounds may have an additive effect?

4 A Yeah. Chemicals that are, you know, fairly
5 similar in chemistry, again, similar phys-chem
6 properties, it's possible that they will have additive
7 effects.

8 Q Could you please briefly describe, for The
9 Commission, the general -- or your -- let me rephrase.

10 Could you describe, for The Commission, the
11 typical pathway of exposure of PFAS to the general
12 population?

13 A Sure. Yeah. For general population,
14 exposure would primarily be through food and water.
15 Drinking water, obviously, could be a municipal supply
16 or it could be a -- a well at someone's house or
17 property.

18 We know that PFAS, it's in the food supply.
19 So I mean that's -- that's where you would get most of
20 your exposure, food and water.

21 Q Okay. I think we've -- did you hear the
22 testimony of Ms. Troutman, related to the spills and
23 release data?

24 A Yes, I did.

25 Q Okay. If PFAS were present in produced

1 water, and that produced water was released to
2 surface, does that establish a, like, cogent or
3 potential pathway of exposure to humans?

4 A Yes. I mean, any human that would -- so I
5 mean, obviously you're going to have some soil
6 impacts. PFAS has the ability to migrate through
7 soil, particularly with water. So rain water for
8 instance.

9 So any anyone that's near the spill site
10 would have, you know, potential exposure in soil. And
11 yeah, PFAS can migrate down to the groundwater table.
12 So they would have the ability to hit the groundwater
13 table, and then, kind of, pancake out from that -- you
14 know, depending on the direction of groundwater flow,
15 you know, would migrate away from there.

16 So there is some potential for people to be
17 exposed if they had a -- a shallow well, I suppose.

18 Q Dr. Martin, the Division's proposal and Red
19 Line focuses primarily on loss -- what I'll call loss
20 of integrity events. So there's a -- a casing failure
21 and -- triggering disclosures, testing notifications,
22 et cetera, where completions fluid or other fluids are
23 released, and they directly travel to groundwater.

24 I -- is it fair to say, like, that
25 represents a clear pathway of concern from a

1 toxicological perspective?

2 A That -- if there was a failure, I mean, that
3 would depend on where your failure occurs. If -- if
4 you're failing in a -- a drinking water aquifer, then
5 obviously that would be a concern. I mean, if there's
6 PFAS in the product, then sure, some PFAS would be
7 released into the water.

8 Q I mean, relative to those two examples of
9 different pathways that we're discussing, in your
10 professional opinion, is it fair to say that the
11 concern of a loss of integrity -- well integrity and
12 contamination direct to sources of groundwater is of
13 more significant concern than the other pathways we've
14 described?

15 A Sorry. You're saying, like, a concern to
16 human health?

17 Q Yes. A concern -- yes. A concern to human
18 health.

19 A And that totally depends on the scenario, I
20 suppose. You know, if there are humans that have,
21 again, access to the site, or whatever, they could
22 have direct contact with the soil.

23 So there could be some exposure there, and
24 it would be difficult to -- you know, I would actually
25 need data to say which pathway in this particular

1 circumstance would be, you know, more of a risk to
2 human health.

3 MR. TREMAINE: No further questions in
4 rebuttal for Dr. Martin. Witness is available for
5 cross.

6 HEARING OFFICER: Thank you very much.

7 MR. TREMAINE: Ms. Mulcahy or
8 Mr. Rankin?

9 MS. MULCAHY: Yes. Thank you.

10 CROSS-EXAMINATION

11 BY MS. MULCAHY:

12 Q Hi, Dr. Martin. I realized that I failed to
13 introduce myself to Dr. Sandau, so my apologies there.
14 I'm Cris Mulcahy. I'm counsel for the New Mexico Oil
15 and Gas Association. Thank you for being here. I
16 just have one question, Dr. Martin. Is exposure the
17 same thing as risk, from a toxicology perspective?

18 A No, it's not. Exposure, you're typically
19 talking about an actual dose. If you have contact
20 with something, you could potentially calculate some
21 sort of dose from it. Risk, you're talking more
22 about, kind of, a probability of something occurring.
23 So a probability of something versus an actual, you
24 know, exposure are definitely two different things.

25 Q And are you familiar, in toxicology terms,

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1 the acronym PBT?

2 A PBT?

3 Q Persistent, bio-accumulative, and toxic?

4 A I -- not off the top of my head.

5 MS. MULCAHY: Okay. I have no further
6 questions. Thank you.

7 HEARING OFFICER: Okay. Thank you.

8 Mr. Maxwell, any questions of
9 Dr. Martin?

10 MR. MAXWELL: I have no questions for
11 Dr. Martin. Thank you.

12 HEARING OFFICER: Thank you.

13 Ms. Kessler?

14 MS. KESSLER: Not from me, Madam
15 Hearing Examiner.

16 HEARING OFFICER: All right. Thank you
17 Mr. Martin -- Mr. Davis?

18 MR. DAVIS: Thank you, Madam Hearing
19 Officer.

20 CROSS-EXAMINATION

21 BY MR. DAVIS:

22 Q Hello, Dr. Martin. I'm Tim Davis. I
23 represent the petitioner, WildEarth Guardians. I
24 wanted to ask you first, your specialty is
25 environmental risk assessment?

1 A That's correct, yeah.

2 Q And on Page 9-0091 of your direct testimony,
3 you talk about -- I'm not sure if I'm going to
4 pronounce this correctly, but the Gluge, et al. study,
5 G-L-U with the two dots I think that's an umlaut -G-E
6 study?

7 A Sure. Can -- can we put that somewhere so I
8 can see what specifically we're talking about?

9 Q I just have a quick question about it, and
10 I'm not sure we even need to see it. That study is
11 the one that identified hundreds of uses for more than
12 1400 individual PFAS compounds?

13 A Okay.

14 Q And then you further state that Buck, et
15 al., and that's another study, noted that 256 PFAS
16 with chemical abstract service numbers are
17 commercially relevant?

18 A Uh-huh.

19 Q And then you go on to state that "The
20 scientific literature is making it evident that PFAS
21 exposure can lead to adverse effects in laboratory
22 rodents"; is that correct?

23 A Yes. Yeah.

24 Q Can you tell us which PFAS are showing this?

25 A The vast majority of the toxicology data out

1 there is for -- are -- are firefighting compounds,
2 PFOS and PFOA perfluorooctanoic acid -- sorry,
3 perfluorooctanoic acid, perfluorooctanesulfonate,
4 anyways, PFOS, PFOA. So -- sorry. Can you repeat the
5 question?

6 Q Sure. You stated that the scientific
7 literature is making it evident that PFAS exposure can
8 lead to adverse effects in laboratory rodents. And my
9 question about that statement is which PFAS are
10 showing that?

11 A Okay. Yeah. Again, that is primarily
12 related to PFOA and PFAS. I was leafing through the
13 ATSDR tox profile again yesterday for -- I've looked
14 at that many times, but was going through it again
15 yesterday. And its tox profile for the -- the Agency
16 for Toxic Substances and Disease Registry.

17 It's, kind of, the go-to place for tox
18 profiles around the world, really. And they -- they
19 include -- it's a 2021 tox profile that includes a lot
20 of the toxicological papers that are being presented
21 for PFAS. And it focuses on ten of the most relevant
22 contaminants.

23 And the vast majority of the tox information
24 available is from PFOA and PFOS. So certainly PFOS
25 and PFOA have the ability to cause toxicological

1 effects in rodents. There's a few other individual
2 PFAS as well, that have been studied in animals,
3 showing the same types of stuff, like liver toxicity.

4 But the depth of the toxicological
5 literature for PFAS is not -- not super impressive.
6 Let's put it that way.

7 Q So I think you mentioned there's about ten,
8 then, of these compounds for which we have studied,
9 two of those, PFOS and PFOA, are the ones that show
10 this adverse effect in laboratory rodents?

11 A Yeah. And again, I'd have to go and take
12 another dive to get -- if you wanted a full list of,
13 you know, of PFAS compounds that have actually been
14 studied, then we'd have to do a little bit more
15 searching.

16 I wouldn't just say that's it two, right
17 now, but not a super extensive list. But
18 there's -- there's definitely other PFAS compounds
19 that, you know, have some studies for them.

20 Q Would it be fair to say that the reason that
21 we know that the -- they show these effects in
22 laboratory rodents are because those are the PFAS
23 compounds that have been studied for that purpose?

24 A Yeah. That they -- I mean they're compounds
25 that -- that we know the most about, the compounds

1 that have been detected most in the environment. So
2 they're -- there're certainly ones that, you know,
3 that we -- again, know the most about, and most
4 relevant as a starting point for trying to understand
5 PFAS toxicology.

6 Q And you also stated in your direct that
7 epidemiological studies are also indicating a link
8 between human exposure to PFAS and adverse health
9 outcomes?

10 A Yes.

11 Q Would those be the same PFAS compounds that
12 are showing the adverse effects in rodents?

13 A The same, yeah. And -- and others as well.

14 Q And that's because those are the ones that
15 have been studied?

16 A Yeah. Pretty much. They're the -- again,
17 the -- the ones that we know the most about, the ones
18 that we've encountered the most in the environment.
19 And yeah, I mean, that's generally where you would
20 start with, you know, trying to figure out what's
21 going on.

22 Q Is it fair to say that for the rest of the
23 universe, the PFAS compounds that have not been
24 studied, we don't know what their toxicological
25 effects might be?

1 A That is a fair statement. Yes.

2 Q And is it fair to say that for the PFAS
3 compounds that we have studied, they generally show
4 these negative health effects that you've talked about
5 both in rodents and in humans?

6 A Yes. I mean, I wouldn't want to extrapolate
7 to other chemicals that we, you know, again, could
8 have very different chemistry, very different, you
9 know, phys-chem properties. So I wouldn't want to
10 make an assumption that everything is toxic when, you
11 know, we know so little about, like, a handful of
12 PFAS.

13 Q And I'm not asking you to make that
14 assumption. I guess, I just want to make sure that
15 the reason that we know that -- whether it's -- I
16 don't know -- I think we've been talking about two
17 specific PFAS compounds to maybe ten that we have data
18 on.

19 The reason that we know that those handful
20 of PFAS compounds are showing negative effects in
21 rodents and humans is because they've actually been
22 studied?

23 A Yeah. That's correct. Obviously to conduct
24 tox studies, you need people, and money, and labs, and
25 there's a limiting factor with that, for sure.

1 Q There's a line in your direct that's a
2 little bit more specific about toxicological effects,
3 that says "PFAS had been further associated with
4 causing cancer in the liver and lung," and that's from
5 the Robarts [ph], et al, 2024, study.

6 A Yeah. That was through -- so those are
7 associations through epidemiological studies. So
8 there's, you know, correlations between, you know,
9 concentrations found in groundwater and blood versus,
10 you know, various types of -- well, two types of
11 cancer in particular.

12 Q And my understanding is that the association
13 between those two types of cancer and PFAS were
14 actually about three specific compounds, PFOA, PFOS,
15 and the GenX; is that --

16 A Yeah. That's correct.

17 Q Those were the only three compounds that
18 were part of that study?

19 A I can't tell you off the top of my head.

20 Q All three of those compounds were associated
21 with cancer in the liver and lung?

22 A There was strong associations between kidney
23 cancer and testicular cancer.

24 Q Okay. And we only know that because we have
25 data on those three PFAS compounds?

1 A That -- that's correct. Yes.

2 Q Moving on, you state further, that "Most
3 available toxicity data on PFAS focus on a few
4 chemicals, mainly legacy compounds, like PFOA and
5 PFOS. Epidemiological studies have linked PFAS
6 exposure to various health effects including immune
7 and thyroid dysfunction, liver disease, lipid and
8 insulin dysregulation, kidney disease, reproductive
9 issues, developmental problems, and cancer with many
10 findings supported by animal studies"; is that the
11 correct statement of your testimony?

12 A Yeah. That's correct. Animal studies have
13 not correlated every one of those items that were
14 listed there, but certainly there were some
15 correlations between animal studies and the human
16 associations.

17 Q So we have limited data on most PFAS, or
18 even no data at all on many of them?

19 A There -- there's a small handful of PFAS for
20 which we have a fair amount of toxicological data.
21 And then there's a very large subset of PFAS for which
22 we have literally no data.

23 Q But the ones that we do have toxicological
24 data on just so happened to show a host of negative
25 health effects for humans and rodents?

1 A Is that a question?

2 Q Yes. The PFAS that we have data on,
3 toxicological data on, those do show negative human
4 health effects?

5 A Yes. The few that we have studied in depth
6 have shown that there are toxicological effects.

7 Q You go on to state, "Given the limited
8 toxicity data for hundreds of PFAS in use, and limited
9 example compounds, precautionary measures may be
10 necessary to safeguard human health based on current
11 knowledge of PFAS impacts"; is that correct?

12 A Yes. That's correct.

13 Q Are you referencing the precautionary
14 principle here?

15 A I'm not referencing it, but I'm making note
16 of the fact that, you know, what we're seeing with
17 some of these PFAS is, I guess, indeed they are, you
18 know, showing toxicity and we should be concerned.

19 Q So given what we know about PFAS toxicity,
20 would this be a situation in which the precautionary
21 principle would be permitted to apply?

22 A Sure. Perhaps.

23 Q I believe you state in your testimony, as
24 well, that California and Colorado have passed PFAS
25 bans in some industries, like oil and gas?

1 A Yes. I believe that's correct.

2 Q Are you familiar with the law that Colorado
3 passed?

4 A I have not read the law that Colorado
5 passed.

6 Q Is it your understanding of that law that it
7 bans PFAS compounds in the oil and gas industry?
8 Sorry. Let me rephrase that question. Is it your
9 understanding that the Colorado law bans the use of
10 PFAS in downhole operations in the oil and gas
11 industry?

12 A I believe that's correct, but I -- I can't
13 say that for certain.

14 Q Are you aware that that law uses a
15 definition for PFAS compounds of compounds with a
16 single fully fluorinated carbon atom?

17 A I'm aware that Colorado a different
18 definition than what we're proposing. Yes.

19 Q Is it your understanding of that law that a
20 operator has to disclose the fullness of chemicals
21 used in hydraulic fracturing fluid to regulators and
22 the public?

23 A I -- I'm not aware of that because again, I
24 haven't read the law. So I don't know.

25 Q Okay. Are you familiar with California's

1 law?

2 A I have not read that law either.

3 Q Okay. I believe you stated in your
4 testimony that contaminated drinking water is one of
5 the most prominent pathways for human exposure to
6 PFAS; is that correct?

7 A Yeah. That's correct.

8 Q Is it fair to say that in a state like
9 California or Colorado, where a full chemical
10 disclosure is required, that a toxicologist can do a
11 more thorough environmental risk assessment in the
12 case of, let's say, a produced water spill?

13 A That might be a fair statement if you have,
14 I guess, a lot more information available to you then,
15 I mean -- again, we've heard this a few times.
16 Scientists always want data, so if -- sure, if someone
17 gives me more data, then that would probably make me
18 happier.

19 Q I want to ask you quickly about the drinking
20 water standards that have been established in -- by
21 the EPA for certain PFAS compounds. Are you familiar
22 with the fact that they have been established for
23 certain PFAS compounds?

24 A Yes. I have reviewed that.

25 Q And some of those limits are in the parts

1 per trillion?

2 A That's correct. Yeah.

3 Q And I don't know if -- I believe you're
4 sitting in the room when Dr. Sandau testified that
5 parts per trillion for the drinking water standards
6 are set for specific compounds; correct?

7 A Yeah. That's correct.

8 Q And my question about the parts per trillion
9 standard is who are those applicable to? And
10 I -- maybe I'll just go through an example. Are
11 they -- this -- is the toxicological effect on a
12 healthy adult the same as it would be on a child?

13 A It -- it can be different, for sure. I
14 mean, the -- the doses can vary based on, you know, a
15 number of things. I mean, if you're a child crawling
16 on a floor that has lots of PFAS in the -- in the
17 carpet materials, and kids tend to put their mouths,
18 and -- their hands in their mouths a lot more than
19 humans -- or adults.

20 You can definitely have, you know, certain
21 populations that are, you know, more -- more prone to,
22 you know, toxicological effects with
23 different -- different doses for different groups of
24 people.

25 Q Would that statement also be true for the

1 immunocompromised?

2 A Yeah. That's possible.

3 Q The PFAS that have been regulated by the EPA
4 for drinking water standards, those are the PFAS for
5 which we have data sufficient to regulate; is that an
6 accurate statement?

7 A Yeah. That's a fairly accurate statement.

8 Q And so then, the PFAS for which we have data
9 that's accurate and thorough enough to actually
10 regulate, for those compounds, we -- the EPA has set
11 very low thresholds, in the parts per trillion; is
12 that also correct?

13 A Yeah. I think it's safe to say that the
14 precautionary principle is used in development of
15 those guidelines. Parts per trillion is, you know,
16 obviously extremely low concentrations that are
17 challenging labs. And, you know, you're basically
18 approaching background concentrations with, you know,
19 measuring things in parts per trillion. So.

20 Q Is it fair to say that the PFAS compounds
21 that are not regulated under the EPA's drinking water
22 standards, for those compounds, we just don't know if
23 they're as toxic as the ones that have been regulated.

24 A Yeah. I mean, without studies to support
25 whether or not they're showing toxicity, or no

1 toxicity, I mean, there's -- there's no real way of
2 knowing. I mean, you could look the chemical
3 structures and try to make some inferences, but
4 without actual studies, you're going to have a hard
5 time making decisions on toxicity. Yes.

6 Q You were asked on rebuttal about additive
7 toxicity. Do you recall that?

8 A Yes.

9 Q And I believe you said -- you referenced the
10 fact that we may be making -- we don't have data on
11 additive toxicity for PFAS; is that correct?

12 A I believe it's very little out there.
13 I -- I think there's a couple of papers that talk
14 about it. I mean, from a toxicologist, it would be
15 nice if we could have -- chemicals and take an
16 approach like dioxins furans, for instance. Just
17 don't know if that's something that's plausible.

18 Q But because we don't have data, we would be
19 assuming?

20 A Yes. And again, given the huge variety of
21 PFAS chemicals out there, and in terms of their
22 chemistry, and again, this phys-chem properties,
23 very -- very unlikely that they're all going to
24 add -- or act in an additive manner.

25 Q Is the inverse also true that it's likely

1 that some will act in an additive manner?

2 A Yes. I believe so.

3 Q Mr. Tremaine also asked you about spills as
4 a pathway -- let me be more specific -- about produced
5 water spills that may contain PFAS compounds as a
6 pathway to potential groundwater contamination. Do
7 you recall that?

8 A Yes. Yeah.

9 Q And I believe your testimony was that yes,
10 it's possible that a spill, if it contains PFAS, could
11 first contaminate soil at the site the spill?

12 A Yeah. I mean, if you -- I mean, I assume
13 that -- I suppose they could spill it into water as
14 well, but you know, a lot of spills obviously happen
15 on land.

16 Q And so for a spill that happens on land, it
17 could also -- the PFAS compounds could migrate, for
18 instance, through a rain water event, and find their
19 way into the groundwater?

20 A Yeah. That's correct.

21 Q Would you agree that the migration of the
22 PFAS compounds in groundwater might be exacerbated in
23 a region of karst geology?

24 A I -- I can't speak to that. Yeah.

25 I'm -- I'm going to leave that alone. I'll leave that

1 to a geologist, I think, to make comments on.

2 MR. DAVIS: All right. Thank you,
3 Dr. Martin, for your time. I have no further
4 questions.

5 HEARING OFFICER: Thank you, Mr. Davis.
6 Mr. Chair, do you have questions of
7 Dr. Martin?

8 CROSS-EXAMINATION

9 BY MR. RAZATOS:

10 Q Doctor, thank you for your testimony today.
11 Appreciate it. I do just have a few questions. You
12 started off speaking to us this morning that all PFASs
13 aren't toxic, and some are inert. Can you explain
14 that to us, please?

15 A Sure. And I mean, some are known to not
16 have, you know, toxicity associated with them. And
17 obviously some -- some do. And the ones that do are
18 being studied more thoroughly. And again, it's a huge
19 range of chemicals, and the vast majority of them
20 have, you know, no tox data for them.

21 So we just -- you know, we can't say for
22 sure there's no toxicity associated with the chemical
23 that you've done no studies on.

24 Q Okay. So I guess, with the statement
25 that -- the conundrum that we have as a commission

1 here is that we're, kind of, being told that all PFASs
2 are going to cause some type of adverse health
3 reaction, and yet the statement also is, kind of, out
4 there now that some are inert, and they don't do
5 anything.

6 How do we clear that up for this body as
7 we're looking at the topic of PFAS and how it's used
8 in the oil and gas industry, in your opinion?

9 A Yeah. It is a conundrum. It's a problem.
10 You could get into, you know, those programs that are,
11 you know, quantitative structure, activity
12 relationship type programs that you can enter
13 chemicals into, and it will tell you, you know,
14 potential toxicity, based on the chemistry.

15 It's -- it's tough. I mean, we don't even
16 have the mode of action fully elucidated for PFOA and
17 PFOS, the two, kind of, main PFAS we have the most
18 toxicological data for. So I -- it -- it's different.
19 It's difficult to extrapolate to PFAS with, you know,
20 with no data for them. It is a conundrum.

21 Q Okay. So at least we're not alone in our
22 conundrum. So that's the difficult part. Now, the
23 only other question that I had, you mentioned in your
24 direct, on Page -- it's OCD Exhibit 9-0092.

25 On -- starting with Line 30, you stated that

1 "The rationale for the updated definition was to have
2 a coherent and consistent definition across compounds
3 from the view of the chemical structure."

4 And your definition was intended to be
5 easily implemented for distinguishing between PFAS and
6 non-PFAS chemicals, and easily understood by experts
7 and non-experts alike. I understand that -- how that
8 works on a chemist's side. How does that work for a
9 toxicologist?

10 A I mean, we -- we weren't considering,
11 really, toxicology when we were defining PFAS. So
12 yeah. I mean, it -- it just wasn't considered.

13 Q Okay. So then, just -- and again, I want to
14 clarify -- I have mentioned it earlier today, I do
15 believe, that these chemicals can be very dangerous.
16 I don't want anybody thinking that I'm a proponent of
17 PFAS. By no means. But -- yeah. I'm not the poster
18 child with PFAS here.

19 A Me neither.

20 Q But how does then, this -- the proposed
21 definition from the OCD help us make sure, as was
22 mentioned by Commissioner Bloom earlier as a question,
23 help us not only protect -- and I'm asking you as
24 a -- in your capacity as a toxicologist -- not only
25 protect the citizens of the state of New Mexico, but

1 also not place such an undue burden upon the oil and
2 gas industry?

3 Where does that middle line -- how does this
4 governing body come up with something from the
5 standpoint of a toxicologist?

6 A I mean, the likelihood that -- you know,
7 there's only -- I don't know, 50, 100, 150 PFAS,
8 maybe, that could be used in the oil and gas industry,
9 from what I understand. Again, the chances of having,
10 you know, all sorts of different PFAS in these
11 products is -- it's just not likely.

12 And, you know, if -- if there was all sorts
13 of PFAS out there that were at high concentrations,
14 and again, you don't necessarily need high
15 concentrations, we don't think, but I -- I just -- I
16 just don't know that -- you know, I think that we're
17 pretty much covering ourselves with these -- with the
18 lists of 50, 60, 70 PFAS compounds that we have.

19 Our understanding of the toxicology of PFAS
20 is going to evolve a lot in the next -- next five,
21 ten, fifteen years. But we're -- you know, we're at a
22 point, right now, where we're trying to make decisions
23 about compounds that we just don't know a lot about.

24 And it's hard, like, it's hard. The
25 likelihood there's other PFAS, you know, chemicals out

1 there that we're unaware of, I think is fairly low.
2 But again, I -- I -- we don't know.

3 Q Okay. So then, just a subsequent question.
4 We heard Dr. Sandau earlier state that the way that
5 this proposed rule is submitted from the Oil
6 Conservation Division, it is, for lack of a better
7 term, more dynamic because it allows for growth, it
8 allows for the ability for other PFAS compounds to be
9 added to the list.

10 Is that a sentiment that you share as well,
11 and as a toxicologist, do you feel that that provides
12 the assuredness, the safety for the citizens of New
13 Mexico?

14 A I think it's an appropriate approach given
15 the circumstance. I mean, keep in mind that
16 everyone's exposed to PFAS chemicals pretty much on a
17 daily basis, and most of us are not sick. Not to say
18 that, obviously, some PFAS compounds are not, you
19 know, producing toxicity, but certainly our bodies
20 have the ability to manage and deal with some levels
21 of -- of PFAS.

22 So I -- I think it's an
23 appropriate -- appropriate manner. And -- and again,
24 I have been told that, you know, when there are
25 releases, and spills, and stuff, that the -- the list

1 of compounds would have to be released to the OCD to
2 take into consideration, for, you know, for site
3 assessment or monitoring type work. So I -- I think
4 it's a good approach.

5 And -- and again, you know, the US EPA just
6 came out with, you know, in 2024, some, I'd say, quite
7 low numbers for groundwater. So I mean, I think we're
8 at a point where there's adequate health protection in
9 place.

10 MR. RAZATOS: Excellent. Thank you,
11 Doctor. Appreciate it. No further questions for me.

12 HEARING OFFICER: Thank you.

13 Commissioner Bloom?

14 MR. BLOOM: Dr. Martin, thank you for
15 your testimony. I don't have any questions for you.
16 Thanks.

17 HEARING OFFICER: Thank you.

18 Commissioner Ampomah?

19 DR. AMPOMAH: I do have quick ones for
20 you.

21 CROSS-EXAMINATION

22 BY DR. AMPOMAH:

23 Q So in your testimony, I'm -- presume this
24 one will be Page 1, I know Davis tried to ask you
25 about this question, but I did not get a clear answer

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1 on that. Line 9, "The scientific literature is making
2 it evident that PFAS exposure can lead to adverse
3 effects in laboratory rodents."

4 Yeah. So that one, can you be very specific
5 with regards to what type of PFAS are you talking
6 about here?

7 A There -- there is a lot of studies. I'd
8 have to go digging again into the literature, but for
9 sure, you know, PFOA and PFOS again, have a fair
10 amount of toxicological data for those ones. There's
11 quite a bit of animal studies on those two specific
12 PFAS chemicals.

13 There is a handful of other chemicals for
14 which there's, you know, animal data available.
15 Again, I, -- I would have to go look up the specific
16 PFAS that have.

17 Q Yeah. So during the direct, you talked
18 about -- and even some of -- I think The Chair also
19 talked about this, you're saying that some of these
20 PFAS are non-toxic.

21 Now, The Commission do have a -- you know,
22 we do have to look at either banning the entire PFAS,
23 you know, so -- and this is probably the first time
24 I'm hearing that some of it is not really toxic. So
25 where do we draw the line, if you can comment on that?

1 A Sorry? Where do we draw the line with?

2 Q The ban on PFAS, entirely?

3 A That's a good question. Well, you can start
4 with the ones that we know have, you know, toxicity
5 to -- or associated with toxicity in humans and
6 laboratory animals, I think, as well. That probably
7 wouldn't be a very long list, and some of those have
8 prematurity been essentially banned, like your PFOS
9 and PFOAs of the world.

10 You could try to come up with a -- a list, I
11 suppose, of PFAS that, you know, that we suspect of
12 being toxic, or having, you know, potential for
13 toxicity. Again, if you're using toxicological data
14 as your basis for eliminating PFAS, then, you know,
15 that's not going to be an extensive list. So again,
16 based on the available data.

17 Q So then that will, more or less, align with
18 the NMOCD's definition where it's, more or less,
19 limited to about 40 to 70 compounds?

20 A Yes. You're talking about the ones for
21 analysis that we were talking about previously? Up to
22 70, I guess, we're talking about?

23 Q Yeah. So I'm asking you. So we're talking
24 about, you know, in terms of a entire ban on the PFAS,
25 and then you're saying that we should focus on the

1 ones that have been selected to be more toxic, or more
2 or less toxic?

3 And I'm saying -- and I'm asking you, is
4 it -- when you say that, are you referencing to the 40
5 to 70 compounds that Dr. Sandau --

6 A No. I'm talking more about, kind of, the
7 ten to fifteen that we might actually have sufficient
8 data to make any inference based on -- you know, any
9 inference on whether or not they're, you know,
10 potentially toxic.

11 Q Okay. Then a little bit --

12 A Probably more like the list of ten in, kind
13 of, the ATSCR tox profile. With maybe a few others,
14 kind of, throw in there, if we're talking about
15 toxicity data.

16 Q No. But I thought NMOCD's definition that
17 your company supported, or, more or less, helped, you
18 know, define the PFAS, that we are, more or less,
19 looking into banning. I thought we're looking at
20 about 40 to 70 compounds. But now you are also -- you
21 are saying ten to fifteen? It's a little bit
22 confusing.

23 A I -- I'm also confused. So you're saying
24 that I suggested that you ban 40 to 70 compounds?

25 Q Okay. So based on Dr. Sandau's testimony,

1 he talked about NMOCD's definition, that you
2 supported, or, more or less, you helped draft it,
3 includes the 40 to 70 compounds that are known to be
4 toxic. But now you are saying it's about ten to
5 fifteen?

6 A Okay. I -- I would have to go back and look
7 at that.

8 Q Okay.

9 A I have a hard time believing there's
10 adequate data on 40 to 70 chemicals to ban them based
11 on, you know, their potential toxicology.

12 MR. TREMAINE: May I respond?

13 DR. AMPOMAH: Yeah. I'm okay with
14 that.

15 MR. TREMAINE: I -- Commissioner
16 Ampomah, I believe a review of the record will
17 indicate that Dr. Sandau testified to the effect of
18 OCD's definition will capture 40 to 70 compounds,
19 presently. His testimony was not that 40 to 70
20 compounds have a demonstrated toxicity for human
21 beings.

22 And our current -- Dr. Martin is
23 testifying that there's a toxicological effect known
24 for ten or so. I don't want to paraphrase while he's
25 on the stand. These are different things. The

1 chemical definition proposed by OCD is more expansive
2 than the list of PFAS compounds that Dr. Martin is
3 saying have an established connection to adverse
4 health effects.

5 Or maybe, perhaps, you rephrase it if
6 it needs to be corrected.

7 DR. AMPOMAH: Thank you for the
8 clarification. That helps a lot.

9 BY DR. AMPOMAH:

10 Q Do you have any reference that you can share
11 with us with regards to the non-toxic PFAS? Do you
12 have any reference?

13 A Not off the top of my -- well, not on right
14 now, but I -- I could certainly provide some
15 feedback --

16 Q Okay.

17 A -- once I'm not sitting here.

18 Q That would be great. You know, I know a
19 question was asked about the California and Colorado
20 ban on PFAS. Now, you have in your direct testimony,
21 on Line 17 and 20, "Some states have outright banned
22 PFAS used under some circumstances or in some
23 industries such as oil and gas," and you cited
24 California and Colorado.

25 So how is this one going to be different

1 from what we are -- what NMOCD is proposing
2 for -- what NMOCD is, more or less, supporting?

3 A I mean, different jurisdictions can take,
4 you know, different approaches to the same problem,
5 but this -- it's probably unnecessary to ban every
6 single PFAS out there, just because, obviously, some
7 are -- that we don't have -- you know, they're not
8 suspected or they're not toxic, or we're
9 not -- they're not expected to be toxic.

10 So I think that -- I just don't see any need
11 to ban chemicals that, you know, for -- for no good
12 reason. If they're providing a purpose to the oil and
13 gas companies, then yeah, based on, again,
14 toxicological evidence that there would be no need to
15 ban them.

16 DR. AMPOMAH: Thank you. No further
17 questions for you.

18 HEARING OFFICER: All right. Thank
19 you.

20 Any reason not to excuse Dr. Martin?

21 All right. Thank you very much,
22 Dr. Martin, for your testimony.

23 DR. MARTIN: Thank you.

24 HEARING OFFICER: Mr. Tremaine?

25 MR. TREMAINE: Madam Hearing Officer,

1 may I have five minutes?

2 HEARING OFFICER: Yeah, certainly.

3 Let's take five minutes.

4 (Off the record.)

5 HEARING OFFICER: We just took a short
6 break to explore temperature controls in the room.

7 We're back with Mr. Tremaine and Mr. Powell. I see
8 Mr. Powell on the stand.

9 Mr. Powell, do you swear or affirm to
10 tell the truth?

11 DR. POWELL: I do.

12 HEARING OFFICER: Thank you very much.
13 Go ahead, Mr. Tremaine.

14 DIRECT EXAMINATION

15 BY MR. TREMAINE:

16 Q Good afternoon, Mr. Powell. Did you prepare
17 direct testimony on behalf of the Conservation
18 Division in preparation for this hearing?

19 A I did.

20 Q Is that included in OCD's submission as
21 Exhibit 2?

22 (OCD Exhibit 2 was marked for
23 identification.)

24 A I believe so, yes.

25 Q Okay. Did you also prepare a Curriculum

1 Vitae for yourself in preparation for this hearing?

2 A I did.

3 Q Is that included as OCD Exhibit 3?

4 (OCD Exhibit 3 was marked for
5 identification.)

6 A Yes.

7 Q Okay. Did you also participate in the
8 preparation of OCD's proposed modifications to the
9 amended application, what I'll otherwise call the Red
10 Line, WildEarth Guardians' rule proposal?

11 A I did.

12 Q And is that included in OCD'S submission as
13 OCD Exhibit number 1?

14 A Yes.

15 Q Okay. Did you also prepare a set of slides
16 describing OCD's proposal about proposed changes?

17 A I do.

18 Q Is that OCD Exhibit Number 4?

19 (OCD Exhibit 4 was marked for
20 identification.)

21 A It is.

22 Q Okay. Did you provide, examples of
23 FracFocus disclosures for The Commission's
24 information?

25 A I did.

1 Q And did you pull those from the FracFocus
2 website yourself?

3 A I did.

4 Q Okay. Are those listed in OCD's submission
5 as Exhibits 5 and 6?

6 A Yes.

7 Q Okay. And did you also prepare a slide deck
8 of rebuttal testimony describing OCD's proposed
9 changes relative to NMOGA's red line?

10 A I did.

11 Q Okay. And is that submitted to The
12 Commission as OCD's Exhibit 11?

13 (OCD Exhibit 11 was marked for
14 identification.)

15 A It is.

16 Q Okay. Do you need to make any changes or
17 clarifications to your direct testimony today?

18 A I don't.

19 Q Do you adopt that written direct testimony
20 as true and accurate today?

21 A Yes.

22 Q Okay. Are the rest of these exhibits true
23 and accurate to the best of your knowledge?

24 A Yes.

25 Q Okay.

1 MR. TREMAINE: Madam Hearing Examiner,
2 I would move admission of OCD Exhibits 1 through 6.

3 HEARING OFFICER: Okay. I'll pause a
4 moment in the event there are objections

5 MR. TREMAINE: And 11.

6 HEARING OFFICER: And 11, 1 through 6
7 and 11. No?

8 Thank you. They're admitted.

9 (OCD Exhibits 1 through 6 and
10 Exhibit 11 were received into
11 evidence.)

12 MR. TREMAINE: Madam Hearing examiner,
13 I have -- I'm going to ask Mr. Powell to provide a
14 summary of his direct testimony -- direct summary, and
15 then I do have a number of rebuttal questions as we
16 earlier noticed.

17 And based on the feedback of The
18 Commission, I believe it may be beneficial for
19 Mr. Powell to work us through both slide decks. So my
20 proposal would be to proceed in that order if it's
21 agreeable to The Commission.

22 So summary, my rebuttal, direct
23 examination, and then moving to both decks.

24 HEARING OFFICER: Are there objections
25 to that plan? No? All right.

1 I would like to mention just one thing,
2 Mr. Tremaine. The notice of this hearing said that we
3 would accept public comment between 8:30 and nine, and
4 4:30 and five. We're less than an hour from 4:30.
5 And at least as of, you know, yesterday, I did have
6 two people who wanted to offer comment at 4:30.

7 So I may break in, in a good point
8 around there just to take two public comments.

9 MR. TREMAINE: I certainly, Madam
10 Hearing Examiner, do not want to go any longer with
11 Mr. Powell than we have to, but I think that by the
12 time we get through the decks, we're going to be
13 pushing the end of the day.

14 So I would propose that we just plow
15 forward, and wherever it's appropriate to stop at
16 4:30, we can pick up again tomorrow.

17 HEARING OFFICER: Oh. Okay. All
18 right. Thank you.

19 BY MR. TREMAINE:

20 Q All right. Mr. Powell, after all that, will
21 you please provide a brief summary, of no more than
22 three minutes, for The Commission, of your direct
23 testimony.

24 A So I'll go over, just shortly, what I
25 included in the direct. OCD supports action regarding

1 the ban of PFAS, as the OCD has defined. The primary
2 goal of OCD's modifications to the proposed amendments
3 is to ensure that changes are protective, ensure
4 proper management of resources, which includes waste
5 and correlative rights as to hydrocarbon resources,
6 staffing resources as to the OCD, and ensuring
7 efficient implementation of those changes.

8 The Division's proposed amendments seek to
9 protect public health and the environment by limiting
10 the exposure to PFAS to groundwater.

11 Q All right. Mr. Powell, thank you for that.
12 I'm going to ask you a number of questions related to
13 prior testimony. And are you familiar with, or have
14 you heard during the course of this hearing,
15 discussion comparing OCD's proposal versus those of
16 other states?

17 A I have.

18 Q Okay. And you were, are you aware of
19 distinction that the comparison is being made between
20 State statutes in other states and a proposed rule in
21 New Mexico?

22 A I did. I heard that with the other
23 witnesses earlier in the week, where in both, it
24 sounded like California and Colorado, enacted
25 legislative bans, where this proposal is looking at a

1 regulatory ban, which are -- are quite different.

2 Q And is that also true in the context
3 of -- outside of a PFAS ban, in terms of a disclosure
4 within the context of oil and gas activities?

5 A I would imagine so. Even though I haven't
6 written too many legislative documents, I would think
7 the disclosure and the discussion over legislative is
8 quite more extensive, more parties involved than a
9 regulatory process.

10 Q And do you understand that the disclosure
11 requirements in Colorado and California are in fact in
12 State statute rather than rule?

13 A Oh. I apologize. I thought you meant
14 disclosure for the actual rulemaking. Yes. The
15 disclosure, from what it sounds like, in California
16 and Colorado are quite different than what it is in
17 New Mexico.

18 Q Okay. In terms of the immediate rulemaking,
19 Mr. Powell, will OCD receive any additional funds or
20 staff as a result of this rulemaking if any version of
21 it is enacted or conjugated by commission?

22 A No.

23 Q Does OCD currently employ any chemists,
24 toxicologists, industrial hygienists or hygienists
25 that are competent to detect, quantify, or assess PFAS

1 chemicals?

2 A Some of our staff may have some background
3 in some of those things, but as far as having somebody
4 on staff for those specific things, no, we don't.

5 Q Does OCD currently have any full-time
6 positions, even if they think that would fit that
7 description?

8 A Not -- looking at the extent in this
9 hearing, just to justify what we're doing, we've had
10 several doctors up here specific to their fields, and
11 that's outside of the experience that OCD typically
12 provides.

13 Q If OCD were to receive disclosures for all
14 downhole or completions activities related to every
15 well, would OCD have the staff to -- or the competency
16 to affirmatively review the content of those chemical
17 disclosures?

18 A Not for all wells, no.

19 Q And for context, in the course of a given
20 year, how many wells are we talking about?

21 A So in our draft, and I'll get to that in the
22 slides we proposed, just for completion -- completion
23 and recompletion activities. In that scope, you're
24 probably looking at two to 3,000 instances per year.
25 If you talk about all downhole and chemical

1 treatments, you're probably looking at tens of
2 thousands of events per year.

3 Q So that's tens of thousands of qualifying
4 events, but is it also true that under OCD's proposal,
5 which we'll discuss in more detail, those disclosures
6 are limited to incidents where there is a loss of
7 containment?

8 A So in OCD's proposal, it would be centered
9 around the loss of integrity of the well itself.

10 Q Okay. And do you believe that, with current
11 staffing competencies and availability, that OCD will
12 be able to appropriately process the -- that number of
13 qualifying events triggering disclosure? Does that
14 question makes sense?

15 A Yeah, it does. And it OCD would, through a
16 couple different avenues. Internal staff, depending
17 on the -- the type of impact, we could always look at
18 outside parties to help in that evaluation. We could
19 also require operators to consult in a third party
20 toxicologist, chemist, those kind of things to ensure
21 that that threshold is met to the OCD's satisfaction.

22 Q Okay. So is the contemplated -- or
23 discussed -- briefly discussed disclosure related to
24 all wells a manageable proposition for the Oil
25 Conservation Division?

1 A For all wells, no, it's, not.

2 Q All right. Did you hear, during earlier
3 testimony, Mr. Powell, a discussion about an
4 additional need for data and specific areas of
5 research?

6 A I did.

7 Q Okay. Does the Oil Conservation Division
8 have any appropriated research budget?

9 A We do not.

10 Q Does OCD participate in or conduct any
11 academic research?

12 A We do not.

13 Q Okay. Notwithstanding that, would OCD
14 support the concept of any other reference research
15 that's been discussed?

16 A We would definitely support more research.
17 I -- I think that's how industries move forward. The
18 way we based our definition was based on the thought
19 process that more research will be done, more
20 chemicals may be added, and we wanted to make sure it
21 encompassed those.

22 Q Does OCD have the authority to require
23 specific investigations or data from operators? And
24 can you very briefly explain the context that that
25 authority might be used in relation to this rulemaking

1 hearing and PFAS disclosures?

2 A In this rulemaking, we're defining it in the
3 rule itself as far as if there's a -- a breach of
4 integrity of the well, if something happens, and we
5 need to do more investigation, we need more
6 disclosure. We've built that into the rule.

7 The OCD, through the Oil and Gas Act, also
8 has subpoena powers and the powers to make
9 investigations as needed.

10 Q I have a few questions segueing to release
11 data. Do you recall from earlier testimony there was
12 some discussion of the number of spills, releases, and
13 produced water volumes?

14 A I do.

15 Q In terms of the spills data, to -- or
16 releases, to what extent does OCD rely on operator
17 reporting?

18 A All. Most data that's in our system is
19 operator-reported. The instances where we find that
20 it's not reported by the operator, OCD typically
21 starts some sort of compliance action with the
22 operator that did report it.

23 And ultimately the -- it's the operator that
24 ends up reporting that as well, because they're the
25 ones with the pertinent data. OCD just verifies and

1 validates what they're reporting to make sure it meets
2 the threshold that OCD's looking for.

3 Q Okay. At a very high level, when operator
4 reports are released to the Oil Conservation Division,
5 what do they report?

6 A At a very high level, they report what was
7 released, what scenario it was released. The -- the
8 new reporting structure builds in proximity to
9 waterways, if water courses were impacted, if
10 groundwater was impacted.

11 So it builds in what was released, where it
12 was released, and if there's any concerns with that
13 release.

14 Q One of the categories of reporting for
15 release data is produced water; is that correct?

16 A That is correct.

17 Q And when an operator reports a release of
18 produced water, what is included in "produced water"?

19 A It's a very broad category when you're
20 talking produced water. It's any water that is
21 produced up the well bore.

22 Q Are completions fluids or other additives
23 that may be used in drilling operations part of that
24 water that gets reported by volume as produced water?

25 A As long as it's fluids, it's gone down the

1 well, and flown back up the well. If it's completions
2 fluids prior to injection, it would not.

3 Q If there is -- if there were to be PFAS in,
4 as we define it, in completions fluids, is it possible
5 that PFAS is then present in the produced water at the
6 surface?

7 A It is possible, yes.

8 Q And are you -- or are you able to quantify,
9 or know how OCD would attempt to quantify, currently,
10 the presence of PFAS in a release?

11 A Prior to this rulemaking, or post?

12 Q Currently?

13 A Currently, OCD doesn't have that as
14 something that we do as a standard as far as our
15 investigations.

16 Q And how do you see that working practically
17 if, for instance, OCD'S proposal was adopted by this
18 commission?

19 A So there would be an investigation,
20 essentially before the release was determined in the
21 well, of the chemicals that were injected into the
22 well. A review of those to see what potentially
23 harmful chemicals are being used by the operator, to
24 see what needs to be investigated.

25 And then as part of that investigation, if

1 there is shown to be an impact to the water, then that
2 release would be transferred into Part 29, which is
3 the release rule.

4 Q Okay. Is it a release if a transporter
5 intentionally dumps produced water?

6 A It is a release, and a violation as well.

7 Q Has OCD -- the Oil Conservation Division
8 taken any enforcement actions for such a fact pattern?

9 A We have.

10 Q Does such a release also qualify as illegal
11 or unpermitted dumping under other OCD rules?

12 A It is.

13 Q And does such a release require delineation,
14 characterization, and/or remediation under Part 29?

15 A It does.

16 Q If such a release impacted groundwater,
17 would there be any other steps required under other
18 sections of OCD rule?

19 A Yeah. As far as the cleanup, it would start
20 under Part 29, and if groundwater was discovered to be
21 impacted, it would transition to Part 30.

22 Q I want to transition very briefly to OCD's
23 proposed language in 19.16.17, that focuses on what
24 I'll call loss of containment with completions or
25 recompletions events.

1 If there is a loss of containment and
2 completions fluids or other fluids are exposed to
3 groundwater, like we just talked about, what is the,
4 like, reporting and triggering mechanism in that fact
5 pattern?

6 A I can pull it up, but at a very high level,
7 it would be an immediate notice to the Division if
8 there was a loss, or potential loss of containment and
9 potential impact. It would be a disclosure to the
10 Division of what chemicals were used in the well.

11 The OCD, the operator, potentially, with the
12 third party as well, would evaluate those chemicals
13 for any potentially harmful chemicals. That fluid
14 stream would be evaluated for those chemicals. And if
15 there is a chemical of concern identified, then it
16 would move to Part 29, and then subsequently Part 30
17 if groundwater is affected.

18 Q Okay. If there is a chemical of concern
19 disclosed to the Division, is it your intent to
20 utilize the standard testing methodologies that we've
21 been discussing to seek to detect that compound?

22 A So in part, yes. For -- for what we're
23 discussing here, it would be those methods that are in
24 the definition, but it also could include all other
25 chemicals of concern that could be in chemicals that

1 we didn't define.

2 It could be chlorides, it could be those
3 kind of DRO/GRO. We would be looking for all
4 chemicals of concern, the way that's written. But for
5 the -- this rulemaking, we would be primarily looking
6 at PFAS using the methods that we proposed.

7 Q Okay. I want to talk a little bit about the
8 disclosure discussion that we've been having over the
9 course of the hearing. To briefly reiterate, it
10 has -- is OCD supportive of the proposal to provide a
11 full chemical disclosure to the public?

12 A We are not.

13 Q And OCD's position -- is it true that OCD's
14 position is that chemical disclosure should be made
15 upon the identification of a qualifying, like,
16 triggering event such as a loss of containment from
17 casing?

18 A So to expand, that's a -- a very deep
19 question. So OCD is looking for a full chemical
20 disclosure on loss on containment to the OCD for
21 trademark chemicals, those kind of things.

22 Because trademark chemicals are allowed to
23 be used in New Mexico, why OCD isn't supporting the
24 full chemical disclosure across the board is because
25 the current authorities in the state.

1 OCD, I don't know if it would support
2 or -- or not support a full chemical disclosure if it
3 went through a legislation. But as it's -- the
4 regulatory State in New Mexico is currently
5 trademarked chemicals, those kind of things are
6 protected for more than just PFAS constituents.
7 It's -- it's wide ranging.

8 Q You beat me to my next question, which is
9 that -- whether OCD supports a full chemical
10 disclosure to OCD, and under what circumstances?

11 A So it would be to the OCD if there was a
12 breach of containment. So if there is that risk or
13 that potential for impact to water, that's where we
14 would be asking for that full chemical disclosure,
15 because, as we talked before, if we cover all downhole
16 scenarios, you're looking at tens of thousands of
17 downhole treatments, chemical treatments, those kinds
18 of things.

19 Whereas OCD is looking -- or if there is
20 that potential to impact, that's where we need to
21 actually perform that more thorough investigation,
22 other than just giving the disclosure. The disclosure
23 is just the initial part of that thorough
24 investigation.

25 Q I want to ask you some questions to, kind

1 of, clarify OCD's proposed scope of chemical
2 disclosures, and why. In the event that OCD were to
3 receive chemical disclosures for any qualifying
4 treatment, whether it's completion, recompletions, as
5 we discussed, downhole activities, I believe you just
6 said that would constitute tens of thousands of
7 reports?

8 A Yeah. For downhole activities, there's
9 tens -- tens of thousands of downhole activities that
10 involve injection of chemicals, whether it be
11 corrosion inhibitor, those kind of things, H2S
12 Scavenger, in the state, every year.

13 So if -- if it incorporated all downhole
14 activities, you would be looking at tens of thousands
15 of instances.

16 Q And to your knowledge, is the Oil
17 Conservation Division subject to the Inspection of
18 Public Records Act?

19 A We are.

20 Q And if OCD were to keep tens of thousands of
21 records in-house, each of those records could be
22 requested by any member of the public; correct?

23 A It could.

24 Q Okay. And the records that we're talking
25 about are -- include contents that are listed as

1 either proprietary or trade secret compounds; is that
2 correct?

3 A Yes.

4 Q And to the best of your knowledge, is it
5 true that there is an IPRA exception where the Oil
6 Conservation Division may have to make the decision to
7 withhold records if they're listed as proprietary or
8 trade secret compounds?

9 A Generally, yes. That's my understanding.

10 Q And so if that were the case, would it be
11 such that, in any such request, OCD would be tasked
12 with assessing whether or not a disclosure in fact
13 incorporated trade secret or proprietary compounds, in
14 order to make the decision whether to release the
15 record or not?

16 A Yes. And to expand on that a little bit
17 further, also caveat with your previous question about
18 adding additional staffing, those kind of things.
19 Currently, if we were doing that with IPRA's, that
20 would take away from staff's other time, both legal
21 and technical, to a perform those evaluations, which
22 would take away from other activities the OCD's
23 performing.

24 Q And if the OCD were to reject a request for
25 production of records based on inclusion of

1 proprietary information, could OCD be subject to a
2 denial lawsuit?

3 A I'm not a lawyer, but I would imagine so.

4 Q Could you explain to -- well, the types of
5 disclosures that we're talking about -- strike that.

6 We can talk about the FracFocus disclosures
7 at some point beneficial to The Commission. But is it
8 your understanding that the -- to some degree, the
9 same information, our general information is already
10 available to the public through FracFocus?

11 A That's my knowledge, yes.

12 Q Okay. And what would be the difference
13 contemplated in OCD's proposal with the level of data
14 or specificity that would be provided in a disclosure
15 triggered under our proposal?

16 A The disclosure, are you talking to the OCD
17 or the -- the disclosure to the other entities
18 with -- that we provided?

19 Q Yeah. Let me rephrase. That was a
20 compound, terrible question. So I'm trying to get at
21 the difference between what's available on FracFocus
22 and what you, as deputy director, will get if there
23 is, for instance, under OCD's proposal, a loss of
24 containment impacting groundwater.

25 So what do you propose that OCD will

1 receive? Will it include CAS numbers, is it other
2 information, et cetera?

3 A So it would include all the CAS numbers.
4 Anything that's currently marked as proprietary in
5 FracFocus, OCD would be looking to get that
6 information as well, as what chemicals could be there.

7 OCD would be evaluating those CAS numbers
8 and our SDSs, those kind of things to see if there's
9 any chemicals of concern or anything that needs to be
10 investigated further.

11 Q Mr. Powell, was there ever a time when OCD
12 maintained such completions or fluids records such
13 that are included in FracFocus today?

14 A Yeah. So OCD attempted that once.

15 Q You're anticipating my next question, which
16 is were there any problems with that process?

17 A Yes. FracFocus is built to contain that
18 information, to make it public, and it's done for
19 various states. It -- it's a repository for various
20 States, various governments, so it's built for that
21 purpose. OCD's system was attempted to be built for
22 OCD, and it was very limited, and it took substantial
23 maintenance to try to keep up. And so that's why OCD
24 moved to FracFocus, is my understanding.

25 Q So is it fair to summarize that that OCD

1 would not find it beneficial or useful to maintain
2 records where there -- disclosure records where there
3 was not a known impact to water?

4 A It would constrain considerable resources to
5 try to move back to that -- that proposition.

6 Q Is it also fair and reasonable to require
7 OCD to take those necessary steps, review the
8 information, and receive more detailed disclosures in
9 the event of a qualifying release or loss of
10 containment?

11 A Absolutely.

12 Q I want to ask you a couple questions about
13 intentional use. Are you familiar or do you recall
14 during the course of the hearing, hearing discussions
15 about intentional use versus unintentional use?

16 A I am.

17 Q And that relates, in this context
18 specifically, to PFAS compounds; correct?

19 A That is correct.

20 Q Okay. Is it fair to say that there's
21 actually two different contexts which we need to
22 address here, being intentional use of additives
23 versus intentional use of background or source
24 materials?

25 A I would maybe phrase it a little bit

1 differently. So there's the intentional use that's
2 being proposed by NMOGA, that's very ambiguous as far
3 as intentional use. It doesn't define who intentional
4 is.

5 So that could be intentional being a
6 chemical company not providing the operator the data,
7 so the operator certifies without having intentional
8 knowledge because they didn't receive it.

9 So that intentional use, the OCD does not
10 look at the intentional -- I believe that you are
11 looking -- which is the second part of what you're
12 looking at, as far as background, using municipal
13 waters, which, based on the experts, could have some
14 background PFAS in it.

15 OCD is looking at chemical additives.
16 They're not necessarily looking for those background
17 items. Those background items should be, typically,
18 regulated by your Department of Health through NMED
19 as -- because they're using municipal water systems at
20 times.

21 They're using drinking water wells, water
22 well fields, those kind of things. So any regulatory
23 purview of those wells themselves is under NMED, not
24 under OCD's jurisdiction.

25 Q So let's talk about that first fact pattern

1 that you articulated. So in the event that, let's
2 say, an operator -- well let me start here. OCD's
3 authority and interaction with the oil and gas
4 industry, is it fair to say it's primarily focused on
5 registered oil and gas operators?

6 A Yes.

7 Q Okay. And so when you -- in an enforcement
8 context, when you deal with an -- well, oil and gas
9 operator, is it common or practical for OCD to also
10 deal with chemical manufacturers or distributors, et
11 cetera?

12 A Through the operators themselves, we deal
13 with the -- the distributors, at times the
14 manufacturers. But it's typically through the
15 operator that we're dealing with them, not -- not
16 outside the operator.

17 Q And is it your understanding that -- strike
18 that.

19 In this fact pattern that you described,
20 where an operator may not have asked a chemical
21 manufacturer whether PFAS was included or not, if OCD
22 is in an enforcement posture with an operator, would
23 that -- well, I'll call it deniability -- on the part
24 of the operator, serve as a bar or an impediment to
25 OCD'S enforcement efforts?

1 A It's rather -- whether it's legitimate or
2 not, we've heard similar arguments from operators that
3 they didn't knowingly use it, they didn't knowingly
4 have these situations, in enforcement actions.

5 Q Okay. And so in terms of the intentional
6 use or non-intentional use discussion that OCD is
7 having in this hearing, particularly with NMOGA's
8 proposal, is it fair to say that OCD feels it's
9 appropriate, under this rule, to hold operators
10 responsible for the negligent use of PFAS in
11 completions or recompletions, for instance?

12 A Yes. And I would phrase that as either
13 negligent or ensuring that they're being proactive,
14 ensuring that the fluids don't -- or the additives
15 don't contain PFAS.

16 Q It -- it's not a defense -- it shouldn't be
17 a defense under this rule to simply not ask your
18 chemical manufacturer whether there's PFAS involved in
19 your --

20 A Correct.

21 Q Right. Now, I want to distinguish that from
22 this discussion about background because I believe the
23 record will reflect that there's some discussion about
24 whether that's intentional or not. And so is it OCD's
25 intent to hold operators under this proposed rule

1 accountable if PFAS is in -- is used in, or is
2 introduced into a completions fluids through source
3 water?

4 A Source water is extremely broad, and for
5 most cases, source water is going to be your produced
6 water or your municipal water supplies, something like
7 that. You know, and the municipal water supplies are
8 outside of OCD's purview.

9 The produced water, depending on where
10 research is, those kind of things, as it develops, we
11 could always look at that as part of what chemicals
12 OCD is looking for, if there is a breach to that well
13 integrity.

14 So if you're using produced water, that may
15 be something that we could have in those discussions
16 with the operator to look at, in that very narrow
17 scope. So when you say source water, that can be very
18 broad.

19 It would be defined, if there was a well
20 integrity issue, as far as what we were looking at.
21 Again, if the Department of Health regulated water
22 wells and they required PFAS to be notified to the
23 operators, whether it was there, and the operator knew
24 it was there and then injected it, that may be part of
25 that scope of investigation.

1 But OCD doesn't regulate the water wells,
2 municipal water supplies, those kind of things.

3 Q What about a fact pattern where an operator
4 is drilling or completing, and using fresh water, and,
5 PFAS is in the fresh water? I believe someone
6 referred to it as a background or it's -- but you're
7 using a fresh drinking water source, and there's PFAS
8 in that; should the operator operators be held
9 responsible for that as a use of a banned PFAS?

10 A I think that would be extremely difficult
11 for the operator to do on every single instance,
12 because of those thousands of cases. They're using
13 the a municipal water, they're using a drinking water,
14 they're using those things in their operations.

15 They're expecting that those wells are
16 permitted through OSE and overseen by NMED, as far as
17 permissible levels. As the expert said earlier, that
18 some of this testing's extreme. You would be asking
19 for, again, tens of thousands of potential scenarios
20 to be testing that background water for those
21 scenarios.

22 So I don't think that that would be feasible
23 in all -- all scenarios.

24 Q So is it your testimony that it's not
25 feasible for OCD or the operators to do background

1 testing of that water?

2 A Correct.

3 Q Okay. And is it a fair characterization of
4 OCD's position and proposal that operators should be
5 responsible for the additives, specifically PFAS, that
6 are used in completions and recompletions, but not
7 PFAS in the environment, for which they have no
8 responsibility?

9 A Correct.

10 Q Okay. I want to talk about the, kind of,
11 enforcement-related questions about the PFAS ban;
12 right? Which, in OCD's proposal, is currently
13 articulated as a certification that PFAS was not used.
14 Has OCD ever banned use of a specific substance in oil
15 and gas development, production, refinement, or
16 transportation prior to this position -- petition?

17 A No. This is the first time that I'm aware
18 of OCD has ever taken an action to ban a chemical.

19 Q Nevertheless, the -- well, would you agree
20 that this is -- under OCD's past practice and
21 statutory authority, that this is an appropriate but
22 extraordinary proposal?

23 A I would say it's an appropriate but
24 extraordinary proposal.

25 Q Some examples. Was there ever a time when

1 mercury was used in oil and gas development or
2 production?

3 A Yes.

4 Q How about asbestos?

5 A Yes.

6 Q How about PCBs?

7 A Yes.

8 Q Lead gasoline?

9 A Yes.

10 Q To your knowledge, are any of those
11 compounds or substances still allowed to be used in
12 oil and gas?

13 A Not that I'm aware of.

14 Q And did -- was OCD and this commission
15 responsible for banning any of -- the use of any of
16 those substances?

17 A No.

18 Q Where did that -- those mandates come from?

19 A I don't know it for certainty, but I believe
20 that those actions are from agencies like the
21 Department of Health, the EPA, those agencies.

22 Q So in all other instances where the
23 Division -- where sub-specific substances are not
24 available for use in oil and gas, those originated
25 outside of the Oil Conservation Division under some

1 other authority?

2 A Correct.

3 Q Okay. I want to ask you, do you recall
4 Commissioner's Ampomah's T zero versus T 20 question
5 earlier? I believe, if I can paraphrase the question
6 was, right now, at T zero, under OCD's definition,
7 there are 40 to 70 compounds that would be effectively
8 banned by a proposal; does that ring true?

9 A Correct. Yes.

10 Q Okay. And I believe you said that at T 20,
11 some time point in the future, there may be 100
12 different compounds. So let's just use 70 to 100. As
13 deputy director, what's your opinion re enforcement
14 discretion, regarding the use of those additional 30
15 compounds?

16 If there's a compound that is not prohibited
17 under the definition today, but is prohibited under an
18 expanded dynamic definition in the future based on
19 additional scientific consensus and development,
20 are -- should operators be held responsible for use of
21 that compound prior to it being effectively banned
22 under the definition?

23 A So I think, looking at spills, and spill
24 history, kind of, correlates to that.

25 There -- there's times where the determination of

1 whether there's a release or not is the determination
2 of when you find the release.

3 I think OCD is trying to be proactive, in
4 including its many substances within caution or
5 clarification as we can -- testing that we can. But
6 as those develop, if, say, 20 years from now, we find
7 that a chemical was used by industry that was harmful
8 to the environment, harmful to public health, then at
9 the time of discovery, we would be working with that
10 company under the spill rule or under Part 30 to try
11 to remediate that instance as that moves forward.

12 What OCD's looking for in this rule is to
13 identify as much as practical at the time of release,
14 and to be involved as practical at the time and
15 release. And it's hard to do that unless you have a
16 testing method to test for.

17 I think the -- the 70 chemicals OCD is
18 looking at testing, potentially, for PFAS now is an
19 extremely large list. I -- I understand that sounds
20 really small when you compare it to the millions that
21 are -- of chemicals that are out there.

22 But the -- or potential chemicals based on
23 the experts. But 70 chemicals are an expansive list
24 based on not all of them have, sounds like, toxicology
25 reports on them. Not all of them can be deemed as

1 toxic at this point.

2 So I think even going as far as we are,
3 we're being extremely proactive and protective, based
4 on those guidelines. And we're doing that based on
5 what we can test for at the time of that well
6 integrity issue.

7 Q Okay. So using that -- one of my previous
8 examples, like, PCBs previously were allowed to be
9 used and were not banned. And then spill rule, a
10 release rule, Part 29 changed. So am I understanding
11 you to say that under that rule, as OCD becomes more
12 familiar, the science develops, that the testing
13 delineation and remediation requirements necessarily
14 change?

15 A And I think we could even expand it a little
16 bit further to chlorides. Prior to the 2018
17 rulemaking under Part 29, chlorides weren't regulated
18 in New Mexico. As far as releases, they had to be
19 conditions of approval, those kind of things on
20 releases if there was an impact.

21 That's one of the primary constituents in
22 produced water impacts. So the OCD adopted a chloride
23 limit in that rule, and any releases discovered today
24 use that chloride limit. Whether they happened since
25 2018, or whether they happened prior to 2018, they

1 have to use that chloride limit.

2 Q So is it fair to say that, as that
3 definition develops, operators could be required to
4 remediate for additional compounds, but would not
5 necessarily be -- strike that.

6 Would you agree that there's a difference in
7 terms of OCD's and enforcement authority in terms of
8 holding operators accountable and remediating
9 contamination versus formal enforcement action and
10 civil penalties?

11 A I think you phrased that well. I think if
12 an operator unknowingly uses it because it's not
13 tested for today, and we find it in 20 years when the
14 definitions things catch up, we may not take an
15 enforcement action against that operator, because they
16 didn't have the knowledge, or it wasn't available to
17 know that it was there.

18 Now, if we find that they intentionally used
19 it, that's something we could always go back and look
20 at. But if it's something that they didn't have
21 the -- the ability to know that was there at that
22 time, we wouldn't be looking at taking an enforcement
23 action on that. We would be looking at taking
24 corrective action with the operator to clean it up.

25 Q Thank you for that. Mr. Powell, I think I

1 would like to move through --

2 MR. TREMAINE: -- if this is still
3 helpful to The Commission, into OCD Exhibit 4, and
4 I'll share screen, and ask Mr. Powell to walk us
5 through.

6 BY MR. TREMAINE:

7 Q So, Mr. Powell, this is OCD Exhibit
8 Number 4. It's already been admitted into the record.
9 Is this the slide deck that you prepared describing
10 OCD's proposed changes to WildEarth Guardians' amended
11 petition?

12 A It is.

13 Q Okay.

14 A And I'm just going to -- pardon as I scroll
15 through, because they're not actually slides. Could
16 you please -- I believe you have already provided the
17 summary, so I'm going to move directly into an
18 overview.

19 Q Could you provide a quick summary, for The
20 Commission, of OCD's changes to 19.15.2.7?

21 A So just to review these -- this
22 section -- because I don't want to read what everybody
23 else can read -- this section regards definitions that
24 are used in OCD's rules, their overall definitions.
25 So the definitions included in these sections affect

1 all rules in the OCD statutes.

2 Q I'm moving to Page 27. Please describe for
3 The Commission the content of this slide?

4 A So the content of this slide is OCD is
5 moving to reject the addition of the definition of
6 chemical and chemical disclosure list as previously
7 discussed. I'll hit chemical disclosure list first.
8 OCD is not supporting that action at this time.

9 And then OCD is requesting to remove the
10 word "chemical" from a definition -- the definition
11 primarily because it's a common industry term and it's
12 used in several other OCD rules, and OCD wants to make
13 sure there's no unintended scope or consequences from
14 using that definition.

15 Q Well, generally speaking, as we work through
16 the definition section, Mr. Powell, is it true that
17 adding a specific -- or a PFAS specific definition to
18 any of these proposals in Part 2 could have unintended
19 consequences of limiting the normal applicability of
20 that same term in other sections of rule?

21 A That's correct. And -- and maybe I didn't
22 address that well enough to start with. Anything in
23 Part 2 affects all of OCD's rules. So anything
24 included in Section 2, say "chemical" is referenced in
25 some other abstract rule, it would affect that use as

1 well.

2 There's not a PFAS-specific section in OCD's
3 rules, so that's why WildEarth Guardians used it in
4 Section 2, and that makes sense. But as a general
5 definition, it can have unintended consequences.

6 Q Okay. I'm going to move more quickly
7 through these, and just refer to you slide by slide
8 and you can provide your explanation. Please describe
9 Page 28.

10 A So 28 is "downhole operations." OCD is
11 moving to strike that because it can encompass several
12 actions, as we discussed earlier. It can encompass
13 tens of thousands, and defining it may inadvertently
14 exclude some of those actions that may need to be
15 included.

16 Q And Slide 29, Hydraulic Fracturing
17 Treatment?

18 A Again, and I think I touched on this one a
19 little bit more in the slides for the NMOGA rebuttal
20 because they left it in as well. Again, OCD is moving
21 to strike it because it's a common industry term. I
22 think everybody understands its common definition, but
23 if you limit it, for example, under hydraulic
24 fracturing, they include hydraulic fracturing fluid
25 under pressure without defining what fluid is.

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1 In a common practice, some people may not
2 define nitrogen as a fluid, even though it's commonly
3 used in hydraulic fracturing operations.

4 Q So are you concerned that the use of -- that
5 this is a necessary definition and use of the word
6 "fluid" could cause confusion?

7 A Yeah, "fluid" is just one example of where
8 those concerns come from. It's a common industry
9 term. I think everybody that does hydraulic
10 fracturing understands its use. So I think defining
11 it potentially causes complications.

12 Q All right. Moving on to Page 30, "PFAS
13 chemicals"?

14 A So "PFAS chemicals," this has been discussed
15 extensively up 'til now. OCD is moving to replace
16 this definition for several reasons. One -- the main
17 one is being able to test for what OCD regulates. OCD
18 regulates chemicals under Part 29.

19 They -- obviously, they regulate chemicals
20 under Part 30. All of those are chemicals you can
21 test for to see if they're there, to see what we're
22 dealing with. And they have testing methods.
23 They're -- they're something that can be expected to
24 be tested.

25 They have clear boundaries of what you're

1 testing for, and what potential limits are. OCD
2 included the methods that are currently -- can be
3 tested for PFAS as you heard from the other experts,
4 there could be thousands if not millions of other
5 PFAS.

6 Some may be toxic, some maybe not. OCD
7 wanted to make sure because it -- this is
8 ground -- ground breaking process to ban a chemical
9 that, we don't overstep as far as what we're doing
10 with it. And banning something that may not
11 necessarily be toxic, that needed -- needs to be
12 banned, and that we can test for if there is an
13 impact.

14 Because if somebody says, "Well, it may have
15 PFAS in it," but it can't be tested for reliably, how
16 do an operator prove they can use it? How does OCD
17 prove whether it's there or not without reliable
18 testing?

19 Q Mr. Powell, do you believe that if this
20 commission were to ban PFAS, regardless of its
21 ultimate definition, that that creates an expectation
22 that OCD attempt to effectively enforce that rule
23 provision?

24 A I would think so. And I -- I think that has
25 to be taken in consideration in what we're doing, and

1 the scope of what we're looking at, and how it's
2 looked at.

3 Q Okay. Going to move on to Slide 31, "trade
4 secret"?

5 A The "trade secret," OCD's modification is
6 simply moving it under the State statute for trade
7 secrets. I'll go through later where OCD proposes to
8 use "trade secret" differently than NMOGA or WildEarth
9 guardians. But it's to reflect the statute.

10 So if there's a change to the statute, and I
11 believe WildEarth Guardians was a copy of the statute.
12 The simplicity of stating the statute is if that's a
13 modified, you don't have to go to medical making.

14 Q So for instance, Mr. Powell, if the
15 legislature were to change the definition of "trade
16 secret" and apply an exception for oil and gas, then
17 that definition would automatically apply here?

18 A Correct.

19 Q Moving on to Page 32, "undisclosed
20 chemicals"?

21 A It's a strike of the use of "undisclosed
22 chemicals" as a definition as we'll go into further
23 down the slides. OCD doesn't support the banning of
24 undisclosed chemicals. We're building a methodology
25 of how to get that information if there is an impact.

1 So it's just removing that definition. Because
2 with -- by OCD striking it later on, it's unnecessary
3 here.

4 Q Page 33, "well sites"?

5 A So this is another common term that's used
6 in -- in the oil field. Limiting it may limit some of
7 the enforce abilities because well site may be
8 different for OCD depending on impacts to the surface,
9 whether it's an improved well pad, whether it's
10 outside the approved well pad, whether this includes
11 the areas that are reclaimed or not reclaimed.
12 It -- it has other potential impacts.

13 Q So OCD's use and understanding of "well
14 site" might actually be more broad than WildEarth
15 Guardians' proposal.

16 A I don't think OCD uses necessarily "well
17 site" as far as in some of the rules, how they're
18 directly affected, but it may indirectly affect those.

19 Q Thank you. Could you please describe, like,
20 summarize OCD's proposed changes on Slide 34, like,
21 basically, what does Part 7 relate to?

22 A Oh. Let me look. Part 7 is the forms rule.
23 It's the -- the OCD's rules. It goes through
24 different form types, and individual forms are listed
25 in there, and requirements of the operators for those

1 forms are listed, such as completion reports,
2 completion sundries, those type of things.

3 So OCD's moving to -- to remove the
4 undisclosed chemicals provisions in that we're
5 supporting the certification that no PFAS was used.
6 That's mainly the -- the changes that OCD's looking
7 for.

8 MR. TREMAINE: Great. Do we have time
9 to -- we should probably cut?

10 HEARING OFFICER: Yes. Thank you very
11 much, Mr. Tremaine. I -- stay right where you are.

12 Folks on the platform, we're going to
13 go just a few more minutes with the technical witness
14 we have on the stand. I will invite your public
15 comment within the next ten minutes, but I want to get
16 to a good stopping point with Mr. Powell. Please hang
17 in there with us.

18 BY MR. TREMAINE:

19 Q All right. Mr. Powell, I think
20 that -- well, let's just start here with the chemical
21 disclosure slide on Page 35.

22 A So I think it's probably helpful just to
23 look at the OCD modifications for this, of what OCD is
24 requesting change. It's the strike of the chemical
25 disclosure list. It's clarifying that it -- it's

1 applicable to add a chemical; are chemicals that were
2 added to the fluid used? So it's chemicals that the
3 operator should be working with their chemical
4 companies to identify and ensure are PFAS-free.

5 Those are the main changes -- the theme of
6 the changes in that section.

7 Q Great. And the Slide 36?

8 A OCD agreed with that change.

9 Q All right. And on 37?

10 A So 37, I think the clarification to this
11 area, OCD proposed to keep this data at 90 days
12 instead of changing it to 60 days, just from a
13 functionality standpoint, and to ensure clarity on
14 this one. So the 90 days is from the date of the
15 actual completion itself, not from when the
16 paperwork's filed.

17 So it's not that OCD keeps the paperwork
18 confidential for 90 days. The paperwork is delivered
19 to the OCD on a 105, I believe, at 45 days, or 103 at
20 30 days. So you are looking at, say, the 45 days you
21 would only be -- have a confidential period for 15
22 days.

23 Functionally, with OCD processing, OCD may
24 not have even processed that at that time. That's
25 a -- a quick turnaround, looking at two weeks. Also

1 to evaluate that, if it's going to hearing, to see if
2 it could be confidential or not, whether it should go
3 to hearing; that evaluation takes time.

4 Q Could you please address the "shall" versus
5 "may"?

6 A So the "shall" versus "may," OCD believes is
7 important, as the data may not be requested for the
8 hearing, or it may be deemed additional
9 confidentiality through the Trade Secret Act, those
10 kind of things. So depending on where that lands, the
11 "may" fits that best because it may not be included in
12 the hearing, depending on those evaluations.

13 Q And Slide 38, OCD also agrees with this
14 change?

15 A Yes.

16 Q All right. Please describe
17 Slide -- Page 39.

18 A Slide 39, just in principle, that's not
19 something we typically put in the rules as far as each
20 individual form. It's something OCD does as far as
21 keep those records indefinitely. That's all part of
22 the State Records Retention Act and rules, and that
23 OCD has to abide by it.

24 So including things as far as retention
25 there, if State records made a change, which they're

1 the regulatory body over State records, may conflict.
2 So we're just asking for that removal, even though
3 functionally, we do keep that.

4 MR. TREMAINE: Okay. Madam Hearing
5 Examiner, we're about to move on to, kind of, it's
6 more interesting, more substantive stuff in Part 14.

7 HEARING OFFICER: It's all interesting
8 in substantive, Mr. Tremaine. All right. Thank you
9 for identifying a good stopping point. And I
10 understand that it would be best if we took all of the
11 public commenters available, and then picked up with
12 Mr. Powell in the morning. Is that what I understand
13 your request?

14 MR. TREMAINE: That would be my
15 recommendation. Thank you.

16 HEARING OFFICER: Okay. Thank you very
17 much.

18 So thank you, Mr. Powell. We will
19 calling you no later than nine o'clock tomorrow
20 morning.

21 Let me turn to the folks on the
22 platform. My name is Felicia Orth. I'm hearing
23 officer for The Commission. I'm here with all three
24 commissioners. This is the rulemaking around PFAS
25 chemicals in oil and gas extraction, Case 23580.

1 We have come to another opportunity for
2 public comment. Just a few things. I will ask you to
3 state and spell your name because we are making a
4 transcript. I will ask you if you swear or affirm to
5 tell the truth, and then I will set my stopwatch for
6 three minutes.

7 And if you've already offered public
8 comment, I have to ask you to submit any additional
9 public comment in writing to Sheila Apodaca by Friday
10 at 5 p.m. I can really accept verbal comment from
11 folks just once.

12 We've already had more than four dozen
13 commenters and we have a lot more to get through. So
14 is --

15 MR. RAZATOS: Madam Hearing Examiner?

16 HEARING OFFICER: I'm sorry. Yes?

17 MR. RAZATOS: I apologize. There's
18 also people in the room to comment.

19 HEARING OFFICER: Oh, yes. I will
20 definitely invite public comment from the room. I
21 wanted to start with a few folks who've been on the
22 platform for a while and who signed up earlier.

23 All right. Is Representative Caballero
24 with us?

25 MS. CABALLERO: I am, Madam Hearing

1 Examiner.

2 HEARING OFFICER: Yes. Would you
3 please spell your last name?

4 MS. CABALLERO: Yes. It's a double
5 last name and it is spelled R-O-Y-B as in boy -A-L.
6 Second part of the last name is C-A-B as in
7 boy, -A-L-L-E-R-O.

8 HEARING OFFICER: Thank you. And do
9 you swear or affirm to tell the truth?

10 MS. CABALLERO: I absolutely do.

11 HEARING OFFICER: Thank you. I'll
12 start your three minutes now.

13 MS. CABALLERO: Thank you.

14 Good afternoon, Hearing Examiner,
15 Chair, and members of The Commission. I'm
16 Representative Patricia Roybal Caballero from House
17 District 13, a tenured legislator, social worker,
18 educator, student. And I'm here to speak on behalf of
19 my constituents and the inhabitants of New Mexico
20 because the rule before you not only impacts the
21 people of our lands, but our wildlife and entire
22 ecosystem.

23 The loophole that allows chemicals to
24 be used in operations of younger communities is
25 described as "trade secrets." But what is not a

1 secret about these forever chemicals are their
2 absolutely dire impacts on the health of New Mexico's
3 people and wildlife, and the risks they pose to our
4 water and environment.

5 These chemicals have been proven by our
6 scientific community to be linked to cancer, kidney
7 disease, reproductive problems, and negative impacts
8 on developmental outcomes. The dangers of PFAS were
9 covered up by chemical manufacturers under similar
10 trade secret laws for many decades.

11 That the EPA finally acted to ensure
12 PFAS contamination in our water must be disclosed and
13 regulated. The oil and gas industry must not be
14 allowed to keep hiding behind the same dangerous
15 loophole.

16 In Colorado and California disclosure
17 requirements are enacted by the legislature, but that
18 does not mean the same protections cannot be
19 accomplished through this rulemaking procedure. OCD
20 has the authority and the responsibility to regulate
21 oil and gas production practices in New Mexico and
22 should exercise its responsibility to do so.

23 In the State legislature, we are also
24 concurrently making strides to address oil and gas
25 pollution and the profound consequences of the

1 extraction industry. The federal government has a
2 "chemicals are considered innocent until proven
3 guilty" approach to regulation, which puts the burden
4 on the public, on States, and on regulators to prove
5 harm before a chemical can be restricted.

6 This approach results in widespread and
7 long-lasting harms before limits are imposed, and
8 fails to protect public health. I ask you to adopt
9 the most expensive and protective definition of PFAS,
10 to perfect -- protect New Mexicans.

11 We cannot wait another five decades to
12 find out if we have inadvertently or irrevocably
13 destroyed our most precious resource. What I know
14 from my many years in the legislature, and have heard
15 from countless individuals in our organizations is
16 that we need to be acting in a transparent manner that
17 places the interests of the people above industry and
18 the bottom line.

19 What is before you is not a ban on
20 business. Instead, it is the bare minimum we can ask
21 that the cost of business not put our lives at risk
22 for ourselves and future generations. So I
23 respectfully ask your support for Case Number 23580.
24 And I appreciate your time, and thank you.

25 HEARING OFFICER: Thank you very much

1 representative.

2 Let's see, another person who signed up
3 earlier is Peggy Baker. Is Ms. Baker on the platform?
4 Okay. And another person who had raised their hand
5 earlier was Amit Hassan.

6 No?

7 All right. If you are on the platform
8 and would like to offer public comment, please use the
9 hand raise. Oh good. Just like someone named Byron
10 McMillan just did, please raise your hand. Terrific.

11 Mr. McMillan, would you please spell
12 your name for the record?

13 MR. MCMILLAN: Yes. B-Y-R-O-N
14 McMillan, M-C-M-I-L-L-A-N.

15 HEARING OFFICER: Do you swear or
16 affirm to tell the truth?

17 MR. MCMILLAN: Yes.

18 HEARING OFFICER: Thank you. I'll
19 start your three minutes.

20 MR. MCMILLAN: Thank you. My name's
21 Byron McMillan. I'm a decorated combat vet and an
22 outdoor educator and spiritual guide here in the North
23 Valley of Albuquerque, New Mexico. I moved here five
24 years ago to listen to the land, and answer to what it
25 was calling me to do.

1 And I've been growing soil here in the
2 North Valley on a -- almost an acre of land, trying to
3 remediate soil, create a sponge where water can't
4 leave here, and just whatever -- whatever the land
5 calls me to do.

6 And when I hear about PFAS, and the
7 prevalence all over our planet, when I hear about the
8 hubris of humans not regarding the damage and
9 destruction that PFAS caused to the environment, it
10 just -- it just makes me sad, it makes me angry, and
11 it makes me want to fight back and join as many people
12 to join the fight as possible, to take care of this
13 planet.

14 We've named our land Terra Curativa,
15 which means "healing land," in Italian. The goal is
16 for people to come here, to work the soil, to heal
17 their soul, and to heal the soil at the same time. As
18 we heal the soil, we will heal our souls at the same
19 time.

20 And so this call for a company that
21 comes in to New Mexico that doesn't really care about
22 the people of New Mexico, to disclose whether they're
23 using PFAs [sic] or not, just seems like common sense.
24 And this is a common sense people that live here in
25 New Mexico, and I want to be a part of the people who

1 raise their voice and say "no."

2 I mean, it's just, you know, scripture
3 says humans, you know, professing to be wise, became
4 fools. I don't want to be a part of professing to be
5 wise and becoming fools. It's foolish to just allow a
6 corporation who could care less about the people of
7 that place to do whatever they want and not disclose
8 what they're doing.

9 So I just hope that this legislation
10 passes to force this organization, this company to
11 disclose what they're doing, so that we can make wise
12 decisions. Yeah. I love New Mexico. I love the
13 people in New Mexico. I'm committed to being here,
14 making it a better place to live for all people, and
15 the more than human world.

16 I want to raise my microbes and the
17 mycelium to do their thing, to help us heal our own
18 soul -- souls, and become better people for this
19 planet. So thank you for your time, and I appreciate
20 everyone who's doing their part to make this happen.

21 HEARING OFFICER: Thank you,
22 Mr. McMillan. I believe Ruth Striegel has rejoined
23 us. She was -- yes.

24 Ms. Striegel?

25 MS. STRIEGEL: Yes.

1 HEARING OFFICER: Hello. Would you
2 would spell your last name please?

3 MS. STRIEGEL: My last name is
4 Striegel, S-T-R-I-E-G-E-L.

5 HEARING OFFICER: Do you swear or
6 affirm to tell the truth?

7 MS. STRIEGEL: I do.

8 HEARING OFFICER: I'll start your three
9 minutes.

10 MS. STRIEGEL: Thank you. Thank you,
11 Commissioners, for taking our comments today. My name
12 is Ruth Striegel. I live in Albuquerque, and I am the
13 co-chair of the New Mexico and El Paso chapter of
14 Interfaith Power and Light.

15 Most of our public water supply comes
16 from groundwater. In our desert home with ever lower
17 precipitation, clean water means everything. We count
18 on our municipal water supply to be safe for us, for
19 our children, our animals, and all the natural world.

20 Our religious traditions call us to
21 care for life in all its forms, and call on you as
22 public servants to protect our common good. We must
23 protect this water if we are to continue drinking it,
24 growing food, and protecting life in our state.

25 PFAS chemicals are unsafe at any level,

1 and don't break down in the environment. Once they
2 get into our groundwater, they are there to stay.
3 Epidemiologists have linked them to several cancers,
4 thyroid disease, high cholesterol, preeclampsia, and
5 ulcerative colitis.

6 There is no level of exposure to these
7 contaminants without risk of health impacts. The
8 rates of cancers in young adults are rising, and
9 exposure to chemicals like PFAS is one of the reasons
10 for this rise. Obviously, we should never allow PFAS
11 chemicals to find their way into our ground or surface
12 water.

13 New Mexico presently allows the oil and
14 gas industry to inject PFAS chemicals underground as
15 part of the fracking process, and withhold the
16 information because the exact cocktail is a trade
17 secret. Chemicals with this level of toxicity should
18 never be a secret.

19 We must strengthen regulation and make
20 it mandatory to disclose the use of PFAS. Once in our
21 environment, these chemicals can seep into
22 groundwater, migrate into our aquifers, and become
23 part of solid waste and sludge.

24 I ask The Commission to prohibit the
25 use of PFAS in oil and gas industry operations to

1 ensure the protection of our public health and our
2 environment. Thank you.

3 HEARING OFFICER: Thank you,
4 Ms. Striegel.

5 I believe Ms. Baker has joined us.
6 Let's see. And then we'll go to Mr. Hitt. I'm trying
7 to catch the folks who made an attempt earlier.

8 Ms. Baker? There you are. Hello.
9 You're mute. You're muted. Can you unmute yourself?

10 MS. BAKER: Let see. Did that work?

11 HEARING OFFICER: Ah. There you are.
12 All righty. Do you swear or affirm to tell the truth,
13 Ms. Baker?

14 MS. BAKER: Yes I do. and --

15 HEARING OFFICER: Thank you. I'll
16 start your three minutes.

17 MS. BAKER: Oh. Okay. I am Peggy
18 Baker. I live in Abiquiu, New Mexico. I am part of a
19 501(c) organization called Rio Arriba Concerned
20 Citizens. And I am speaking for myself, and behalf of
21 them. And I -- I -- give me a moment. I lost my
22 notes.

23 Would you like to skip on to somebody
24 else, and I'll take a chance to speak a little later?

25 HEARING OFFICER: All right. We'll

1 loop back to you. Let's go to Mr. Hitt.

2 MS. BAKER: Okay. Yeah. I'm having
3 problems with the computer. Thank you.

4 MR. HITT: Yes, thank you.

5 HEARING OFFICER: Hello. Do you swear
6 or affirm to tell the truth Mr. Hitt?

7 MR. HITT: I do.

8 HEARING OFFICER: All right. I'll
9 start your three minutes.

10 MR. HITT: Yes. Thank you. I
11 graduated from St. John's College here in Santa Fe in
12 1970, and have been active in forest protection issues
13 since then. I -- I do not support the exemption from
14 federal hazardous waste law for the oil and gas
15 industry concerning PFAS, which, as many people have
16 noted, are exceptionally toxic group of chemicals that
17 present long-term and persistent public health and
18 environmental hazards.

19 Most importantly, including the
20 contamination of groundwater in a state where 80
21 percent of New Mexicans depend on groundwater for
22 domestic use. And it is only fair that the oil and
23 gas industry be held accountable to protect public
24 health as are other industrial sectors in New Mexico.

25 In particular, I support a rule

1 prohibiting the use of PFAS in oil and gas drilling,
2 development, and production, in order to prevent the
3 generation of PFAS-contaminated produced water and
4 nondomestic waste. In addition, I urge The Commission
5 to adopt a rule prohibiting the use of undisclosed
6 chemicals, to ensure the reasonable transparency
7 around substances used by the oil and gas industry.
8 Thank you very much.

9 HEARING OFFICER: Thank you, Mr. Hitt.

10 I'm going to turn to a couple of folks
11 in the room and then go back to the platform. Let me
12 say now, and I will repeat it. We do have an
13 interpreter between English and Spanish, who is
14 available Friday morning starting at 8:30. So in the
15 event you are more comfortable offering your public
16 comment in Spanish, I hope you can join us starting at
17 8:30, Friday morning.

18 So in the room, if you would, come up
19 to the stand there.

20 MS. BESOLD: Over here?

21 HEARING OFFICER: Yes.

22 MS. BESOLD: Okay. Right here.

23 HEARING OFFICER: And if you would
24 please state and spell your names?

25 MS. BESOLD: My name is Bobbe. That's

1 spelled B-O-B-B-E.

2 HEARING OFFICER: Thank you. That's
3 helpful.

4 MS. BESOLD: Bobbe, and it's spelled
5 B-O-B-B-E. My last name is Besold, B-E-S-O-L-D.

6 HEARING OFFICER: Okay. And do you
7 swear or affirm to tell the truth?

8 MS. BESOLD: And I'm representing a
9 tiny organization. Sorry?

10 HEARING OFFICER: Do you swear or
11 affirm to tell the truth?

12 MS. BESOLD: I'm still not sure what
13 you said.

14 HEARING OFFICER: You didn't hear me?

15 MS. BESOLD: Uh-huh.

16 HEARING OFFICER: You do?

17 MS. BESOLD: What?

18 HEARING OFFICER: Yes? Okay. And I'll
19 start your three minutes.

20 MS. BESOLD: My --

21 UNKNOWN SPEAKER: Your three minutes.
22 She's starting your three minutes.

23 MS. BESOLD: Oh. Do it.

24 UNKNOWN SPEAKER: You're good to go.

25 MS. BESOLD: Thank you. So I'm with a

1 very small organization called Rivers Run Through Us.
2 We are advocates for the rivers of New Mexico, and
3 water in general in New Mexico. And I'm an educator,
4 artist, activist, and grandmother.

5 And I have a question for you all. I'd
6 like to know if you would raise your hand,
7 which -- which of you -- are any of you parents?

8 HEARING OFFICER: Ms. Besold.

9 MS. BESOLD: Would you raise your
10 hands?

11 HEARING OFFICER: I'm sorry.

12 Questions -- ma'am?

13 MS. BESOLD: Are you not allowed to
14 answer that?

15 HEARING OFFICER: Questions are going
16 to have to remain rhetorical.

17 MS. BESOLD: Okay. I'm just going to
18 assume that some of you are parents, and -- as I am.
19 Ad I'm also a grandmother and -- and this is one of
20 the major reasons why I am here. And I've also
21 testified with you all before.

22 Given that some of you are parents and
23 maybe perhaps grandparents, you will understand the
24 need to put forward and think about the future that
25 our children and grandchildren are going to be living

1 in.

2 And especially, you know, here, we're
3 talking about water. And I'd like to tell you a
4 little bit about something called the economics of
5 biodiversity. It's out of Cambridge University, and a
6 little piece of it is -- it lays out the value of our
7 human existence, and meeting our basic human needs are
8 clean air, clean water, healthy lands.

9 And human health depends directly upon
10 a healthy ecosystem. And what we're talking about
11 here is the oil and gas industry injecting PFAS
12 into -- directly into the wells. And we know, and I'm
13 sure you've listened to a lot of testimony about PFAS,
14 and you know it's called the Forever Chemical. It
15 does not break down.

16 And the -- the Physicians for Social
17 Responsibility announced that in Lea -- Lea County in
18 New Mexico, 6,400 pounds of PFAs [sic] were injected
19 into the wells, and into our earth, and into our water
20 last year, in 2023.

21 So we have traded the long-term
22 ecological health and welfare for short term monetary
23 value -- greed. We're not protecting the people of
24 New Mexico. You're not looking out for the health and
25 welfare of New Mexico.

1 HEARING OFFICER: Ms. Besold, will you
2 wrap up, please?

3 MS. BESOLD: All right. I'm almost
4 done here.

5 So I would like you to please support
6 the Chemical Disclosure Rule. I want to know what's
7 happening. It's my right as a citizen to know that,
8 as it is of everybody. And I would also like you to
9 prohibit the use of PFAS. And thank you. And I hope
10 you'll think about your kids when you make a decision.

11 HEARING OFFICER: Thank you,
12 Ms. Besold.

13 If you would state and spell your name?

14 MR. WIKLE: My name is Glenn Wikle
15 W-I-K-L-E.

16 HEARING OFFICER: Do you swear or
17 affirm to tell the truth?

18 MR. WIKLE: I do. And it's refreshing
19 to be in front of politicians who care about the
20 truth. Thank you so much.

21 HEARING OFFICER: And I'll start your
22 three minutes.

23 MR. WIKLE: All right. Good afternoon,
24 Commissioners. Thank you for the time and energy you
25 contribute to protect our water, air, and health. My

1 name is Glenn Wikle. I'm a consulting engineer and a
2 member of the national environmental justice group,
3 Third Act.

4 I love the open vistas and natural
5 spaces of New Mexico. It's why I make New Mexico my
6 home. As a lover of New Mexico's natural world, I'm
7 frightened by the continued pollution from the oil and
8 gas industry.

9 The footprint of this industry is
10 massive, and it grows every day. From industry-
11 reported data, we know there are hundreds of accidents
12 and spills and leaks every year. Given the fast
13 industry growth rate, I have serious doubts that with
14 their limited funding, OCD and NMED can keep up with
15 all the industry threats to public health.

16 We know that industry is injecting,
17 producing, and occasionally spilling and leaking
18 secret-formula fracking fluid. We suspect it contains
19 a range of toxic chemicals, including forever
20 chemicals, which are linked to health problems, that
21 never break down to safer forms.

22 How can New Mexico regulators safeguard
23 our health if they don't even know which chemicals are
24 being released? It's unconscionable that our
25 environmental stewards have no idea what chemicals are

1 in the spills and underground pollutants created by
2 oil and gas extraction.

3 We simply cannot tolerate injection and
4 release of secret chemicals into our environment.

5 While we must know the entire makeup of fracking
6 formulas, PFAs [sic] are a special case. Because of
7 the large number of PFA [sic] chemicals, research on
8 the health danger is only getting started.

9 These studies take years to reach
10 conclusion. The results for the small number of
11 completed studies are alarming. As a result, EPA has
12 started banning PFAs [sic] in drinking water. Surely
13 in future years many more PFA [sic] carcinogens and
14 toxins will be identified.

15 While 3M is quietly exiting the PFA
16 [sic] business, less reputable companies are picking
17 up the slack. Industry won't regulate itself when
18 there's money to be made. Regardless -- regardless of
19 whether we know for sure how dangerous these chemicals
20 are, we absolutely know they do not belong in
21 underground aquifers or anywhere in our natural world.

22 It is up to you as protectors of public
23 health to require disclosure, and ban new industrial
24 chemicals like PFAs [sic] until and unless they are
25 shown to be harmless. I ask you to stand up for our

1 health, and approve the proposed rules and amendments.
2 Thank you very much.

3 HEARING OFFICER: Thank you, Mr. Wikle.
4 Is there anyone else in the room here
5 to offer public comment? No?

6 Sheila, let's go back to the platform,
7 and if you would take them as you see them. Let's
8 see. I see Lara Adler.

9 Ms. Adler?

10 MS. ADLER: Yes. Hi.

11 HEARING OFFICER: Hi.

12 MS. ADLER: Yes.

13 HEARING OFFICER: Your first name is
14 L-A-R-A?

15 MS. ADLER: Yes. And last name is A-D
16 like David -L-E-R.

17 HEARING OFFICER: Do you swear or
18 affirm to tell the truth?

19 MS. ADLER: I do.

20 HEARING OFFICER: I will set your three
21 minutes now.

22 MS. ADLER: Great. Good afternoon to
23 the board. Thank you for taking everyone's comments.
24 My name is Lara Adler. For the past 13 years, I have
25 been teaching medical and health professionals around

1 the world about the effects of toxic chemicals on
2 human health, and their links to hundreds of chronic
3 health condition, and the regulations or lack thereof
4 of toxic chemicals in commerce.

5 PFAS chemicals have been front and
6 center of my work from day one, so I am acutely aware
7 of the research linking PFAS exposure, including at
8 extraordinarily low levels, to a long list of serious
9 health concerns.

10 The Agency for Toxic Substances and
11 Disease Registry, the ATSDR has identified PFAS
12 exposure being linked to increases in cholesterol
13 levels, lowered response to certain vaccines, altered
14 liver function, pregnancy-induced hypertension and
15 preeclampsia, low birth weight, and kidney and
16 testicular cancer.

17 There is also substantial evidence
18 linking PFAS chemicals to thyroid disease, metabolic
19 disease, cardiovascular disease, infertility and
20 developmental toxicities. PFAS chemicals are the DDT
21 of our time. They are highly persistent. They are
22 bio accumulative, and they are toxic, and we will be
23 cleaning them up for decades.

24 Hold on one second. I just think
25 that, -- if -- can you still hear me? My headset

1 is --

2 HEARING OFFICER: Yes. Yes.

3 MS. ADLER: Okay. Great. It just got
4 the warning that we're running low, so I'm going to
5 get through this.

6 That they are actively being used in
7 New Mexico oil and gas extraction is not only
8 irresponsible, but it's going to be costly to address.
9 A 2021 paper published in Environmental Science and
10 Technology titled "The True Cost of PFAS and The
11 Benefits of Acting Now" found that the estimated cost
12 of just healthcare costs related to PFAS will be
13 between 37 and \$59 billion annually. And surely this
14 is going to be an underestimation.

15 We cannot kick the can of PFAS
16 pollution down to our children, grandchildren, and
17 great-grandchildren. Despite the lack of disclosure
18 or transparency from the oil and gas industry in -- of
19 which PFAS chemicals are -- on which PFAS chemicals
20 are being injected into hydrofracking wells -- there
21 are over 14,000 identified in the PFAS class -- we
22 know that they are present thanks to a report from
23 last year from the Physicians for social
24 Responsibility.

25 We know that on average there are

1 approximately four spills of hydrofracking wastewater
2 happening in New Mexico every single day, that
3 undoubtedly contains PFAS chemistry. This is
4 unacceptable. As is the oil and gas industry hiding
5 behind the trade secret confidentiality claims.

6 Water in New Mexico is already under
7 serious threat thanks to the SCOTUS ruling on Sackett
8 versus EPA that happened earlier this year.

9 Currently, roughly 80 percent of waterways in New
10 Mexico are no longer considered waters of the United
11 States, and therefore not protected under the Clean
12 Water Act.

13 HEARING OFFICER: Ms. Adler, would you
14 wrap up?

15 MS. ADLER: Yes. I have two more
16 sentences.

17 At a time when protections are already
18 stripped from New Mexico waters, we do not need the
19 oil and gas industry messing around with these
20 profoundly toxic chemicals.

21 I ask The Commission to ensure public
22 health by ensuring that PFAS chemistry is prohibited
23 from use in any oil and gas operations. Thank you for
24 your time.

25 HEARING OFFICER: Thank you, Ms. Adler.

1 So next we have Diana Woods.

2 Ms. Woods, looks like your first name
3 is spelled with two N's?

4 MS. WOODS: That's correct.

5 HEARING OFFICER: Do you swear or
6 affirm to tell the truth?

7 MS. WOODS: I do.

8 HEARING OFFICER: I'm going to start
9 your three minutes.

10 MS. WOODS: Thank you so much for
11 allowing me to share this.

12 Last July I joined Daniel Tso on the
13 fracking tour out near Councilor, New Mexico, on the
14 Navajo Nation. I visited many sites, and on the map,
15 I saw there were thousands and thousands more sites on
16 Navajo land.

17 I saw their spills and explosions had
18 occurred, and the big trucks that carried the
19 processed water to dump into a pit somewhere, at
20 undisclosed locations. What I didn't know at that
21 time was that the mixture that these oil and gas
22 companies inject into the earth contained PFAS.

23 I wonder if the Navajo people knew that
24 the releases they signed would allow their drinking
25 water to be toxic for themselves and their children,

1 forever. That the PFAS used to protect oil and gas
2 equipment and processes will bring them cancers, and
3 hormone imbalance, and liver and kidney disease,
4 suppressed immune systems.

5 Even a little tiny bit, that as they
6 drink their toxic water, and their animals drink it
7 also, the chemicals will accumulate in their bodies,
8 be passed down to their infants. There isn't a safe
9 amount.

10 The Navajos, and for that matter, all
11 the people in New Mexico do not know about these
12 chemicals that never go away, because oil and gas
13 don't disclose that they're doing this. These
14 companies will leave here, and we will be stuck with
15 cancer water.

16 They hide behind the Trade Secrets Act
17 saying that disclosure would negatively affect their
18 ability to compete. But really, what they're using
19 the Trade Secret Acts for is to protect their bottom
20 line and to protect themselves from future litigation.

21 The New Mexico Inspection of Public
22 Records Act, specifically Rule 11-508 ensures that the
23 trade secret privilege may be overridden if upholding
24 it would tend to conceal fraud or otherwise work and
25 injustice. I would say that this and all future

1 generations would qualify as injustice.

2 I ask you to do the right thing.
3 Demand disclosure of which chemicals are being used.
4 We don't have to demand disclosure of the exact
5 mixture, so that it will not fall under the Trades
6 Secrets Act.

7 Ban PFAS in New Mexico, and enforce
8 that ban. Thank you very much for letting me speak.

9 HEARING OFFICER: Thank you, Ms. Woods.

10 Is there anyone else on the platform
11 who would like to offer public comment? I know we do
12 need to loop back to Ms. Baker. Please use the hand
13 raise symbol and we will find you.

14 You find Ms. Baker, Sheila? Okay. She
15 may join us, then, at another public comment
16 opportunity. Let me mention there are still a couple
17 more public comment opportunities, and of course an
18 opportunity to submit public comment in writing as
19 well.

20 You may submit public comment in
21 writing to Sheila Apodaca until 5 p.m. on Friday.
22 Opportunities for oral public comment, the next one is
23 8:30 tomorrow morning, and I take as many comments as
24 there are to be given, and then we go back to the
25 technical case.

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Four-thirty tomorrow afternoon, I'll take as many comments as there are to be given, and then break for the day. And then Friday at 8:30 in the morning. And what's important about Friday at 8:30 in the morning is that we will have an interpreter between Spanish and English for that public comment period.

Counsel, anything else we need to do before we break for the day? I don't think so; just double checking. No?

Have a safe drive home.

(Whereupon, at 5:07 p.m., the proceeding was concluded.)

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CERTIFICATE

I, JAMES COGSWELL, 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.



JAMES COGSWELL
Notary Public in and for the
State of New Mexico

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CERTIFICATE OF TRANSCRIBER

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