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STATE OF IOWA  
DEPARTMENT OF COMMERCE  
BEFORE THE IOWA UTILITIES BOARD

----- X  
IN RE: :  
: Docket No.  
SUMMIT CARBON SOLUTIONS, : HLP-2021-001  
LLC :  
----- X



TRANSCRIPT OF HEARING  
VOLUME 14  
PUBLIC TRANSCRIPT

Cardiff Event Center at  
Fort Frenzy  
3232 First Avenue South  
Fort Dodge, Iowa 50501  
Tuesday, September 19, 2023

Met, pursuant to order, at 8:00 a.m.

BEFORE: THE IOWA UTILITIES BOARD  
  
ERIK M. HELLAND, Board Chair (Presiding)  
JOSHUA J. BYRNES, Board Member  
SARAH MARTZ, Board Member

(Pages 3653 to 3865)

MELISSA A. BURNS - CERTIFIED SHORTHAND REPORTER

**LO #23 – 5/24/24**  
**PU-22-391**

IN RE: SUMMIT CARBON SOLUTIONS  
HEARING 09/19/2023

Page 3803

[REDACTED]

23 MR. ISENHART: Mr. Chair, I call Ryan Clark

24 as a witness.

25 While he's approaching the stand, I would

1 like to, for the record, make a correction. Mr. Clark  
2 does not have a PhD. So it was erroneous for me to  
3 refer to him as "Dr. Clark" in my offer of a witness.  
4 We neglected to proofread that document. Which is a  
5 cardinal sin for somebody trained as a newspaper  
6 reporter.

7 So, with that correction, I'll offer Ryan  
8 Clark as a witness.

9 BOARD CHAIR HELLAND: Thank you for the  
10 clarification.

11 Go ahead and turn your microphone on. Make  
12 yourself comfortable. Make sure you're speaking into  
13 the microphone no matter where you're turning.

14 Raise your right hand.

15 RYAN CLARK,  
16 called as a witness by Representative Charles  
17 Isenhardt, being first duly sworn by Board Chair  
18 Helland, was examined and testified as follows:

19 BOARD CHAIR HELLAND: Representative  
20 Isenhardt.

21 MR. ISENHART: Thank you, Mr. Chair.

22 DIRECT EXAMINATION

23 BY MR. ISENHART:

24 Q. Mr. Clark, are you the Ryan Clark whose  
25 testimony I solicited and filed on September 11?

1 A. Yes.

2 Q. If I were to ask you the same questions  
3 today, would your answers be the same?

4 A. Yes.

5 Q. Do you have any corrections or additions to  
6 that testimony?

7 A. No, I do not.

8 MR. ISENHART: Would now be the appropriate  
9 time to offer his testimony and exhibits?

10 BOARD CHAIR HELLAND: Are you making that  
11 motion?

12 MR. ISENHART: Yes.

13 BOARD CHAIR HELLAND: Thank you.

14 MR. ISENHART: I believe there are three.  
15 One is his CV and a couple others are PowerPoint  
16 presentations he has made on this subject.

17 BOARD CHAIR HELLAND: Thank you.

18 Do we have objection?

19 MR. WHIPPLE: Your Honor, the Counties have  
20 some concerns about how late this testimony was filed.  
21 It seems to be of the kind of gravity that would  
22 demand the parties have a chance to find other experts  
23 to inform our questioning of this witness and maybe  
24 find rebuttal testimony.

25 This was filed on September 11. And we

1 don't claim that it's not relevant, but I'm struggling  
2 a little bit with the time we've had to prepare for  
3 this witness, Your Honor.

4 BOARD CHAIR HELLAND: Thank you.

5 Mr. Taylor, did you have a comment or are  
6 you lining up first?

7 MR. TAYLOR: I'm lining up first.

8 BOARD CHAIR HELLAND: We got you.

9 Are there any other objections before the  
10 Board makes a decision?

11 MR. DUBLINSKE: Your Honor, I'm at least  
12 partially going to join and partially going to resist  
13 Mr. Whipple's objection.

14 We do have concerns about the timeliness.  
15 Obviously it was well after the deadline, including  
16 the deadline for witnesses and exhibits. I want to  
17 reserve that because there are other examples of  
18 brand-new persons being brought in, brand-new parties  
19 being brought in, that I'm going to want to reserve  
20 for later.

21 On this one, I think that if the Board lets  
22 it in, that is not cause to allow any sort of  
23 additional rebuttal. There normally wouldn't be a  
24 rebuttal round to this testimony anyway. And we're  
25 now eight days past and providing eight days of

1 opportunity for preparation of cross, which certainly  
2 we've done things quicker in this case, but we do have  
3 concerns about the timeliness of the filing. And that  
4 will be a theme that will recur here in the coming  
5 weeks.

6 MR. ISENHART: Would you like me to make an  
7 observation, Mr. Chair?

8 BOARD CHAIR HELLAND: Not yet, but in a  
9 moment you'll have a chance.

10 Mr. Whipple, did you have a response or  
11 clarification?

12 MR. WHIPPLE: One clarification, Your  
13 Honor. I'm not exactly asking for more rounds of  
14 rebuttal, but I would say the Counties would very much  
15 have preferred this testimony to come in much earlier  
16 so that it could have been more fully developed as  
17 part of the record. Both the direct testimony and the  
18 exhibits.

19 So I'm not trying to drag out the  
20 proceedings, but this seems to be important testimony,  
21 Your Honor.

22 BOARD CHAIR HELLAND: Thank you.

23 Representative, did you have --

24 MR. ISENHART: I acknowledge the lack of  
25 timeliness on this and would have not objected had the

1 Board decided not to allow me to offer the witness. I  
2 would just note that in response to previous  
3 testimony, two of the three Board members asked  
4 specifically about the potential for carbon  
5 sequestration in Iowa. Therefore, I thought it  
6 important to make this testimony available.

7 BOARD CHAIR HELLAND: Thank you.

8 Give us just a minute here.

9 (Recess taken at 1:18 p.m.)

10 (Hearing resumed at 1:28 p.m.)

11 BOARD CHAIR HELLAND: We'll go back on the  
12 record. Thank you. Sorry for the pause. I  
13 appreciate that.

14 After much deliberation, the Board will be  
15 admitting the evidence and testimony of the witness  
16 for Representative Isenhardt.

17 However, at this point, we also want to  
18 remind the parties yet again that our rules, our  
19 procedures, have been in the administrative code, they  
20 have been in our orders for months. Attorneys and  
21 parties continue to file late and file improperly.

22 We have rules and we have procedures for a  
23 reason. And it is very frustrating to try to put on a  
24 timely and orderly hearing when so many parties refuse  
25 to follow these rules.

1                   So this evidence appears to be relevant.

2       As such, we will admit it and put the parties on  
3       notice yet again that we encourage you to review the  
4       rules and previous orders and act accordingly.

5                   Representative Isenhardt.

6                   MR. ISENHART: Thank you. Points taken.

7                   I make Mr. Clark available for  
8       cross-examination.

9                   BOARD CHAIR HELLAND: Thank you.

10                  Mr. Taylor, you're first.

11                  MR. TAYLOR: Thank you.

12                               CROSS-EXAMINATION

13       BY MR. TAYLOR:

14               Q.    Mr. Clark, the substance of your testimony  
15       is that your agency, the Geologic Survey, is -- I'm  
16       not sure if "exploring" is the right word in this  
17       context, but considering the idea that maybe there is  
18       a site in Iowa where the carbon dioxide from the  
19       ethanol plants could be sequestered.

20                               Is that a fair statement?

21               A.    Yeah, I think I would suggest maybe using  
22       the word we are -- we believe that it can happen. I  
23       don't know that I would go so far as to say that we  
24       are actively researching it. But, yes, it is our  
25       belief that the potential is there.



1           Q.    I guess you anticipated my next question.  
2   How much do you know and what is the state of your  
3   belief, so to speak, that there could be a  
4   sequestration site in Iowa?

5           A.    That's a tough one to answer, but I'll try.  
6   You know, it comes down to -- you know, the state of  
7   our understanding of the deep subsurface geology of  
8   Iowa is more limited than some states. Part of that  
9   is because we don't have a history of petroleum  
10   production or other extractive industries that would  
11   require more investigation of the deep subsurface.

12                So, based on the limited information that  
13   we do have of the rocks that would be considered  
14   targets, the evidence from those samples looks like  
15   there could be some places in Iowa where we could do  
16   this.

17           Q.    And do you have any sense of whether that  
18   would be sufficient space, underground space, to store  
19   the amount of carbon dioxide that Summit, and the  
20   other pipeline companies for that matter, are  
21   considering?

22           A.    The evidence we have does suggest that  
23   there would be enough storage space, yes.

24           Q.    On into the future?

25           A.    Yes.

1           Q.    I think your testimony indicated that,  
2   aside from the Geologic Survey, there were other  
3   studies that have been or are being conducted on  
4   sequestration in Iowa.

5                   What are those studies and what have they  
6   shown so far?

7           A.    I had made that comment in my written  
8   testimony because I'm aware of some private companies  
9   that have asked the Iowa Geological Survey for certain  
10   information. Some of those companies have actually  
11   just said outright that, "We are looking at the  
12   potential to sequester in Iowa."

13                   And that's as far as it's gotten. That's  
14   all that I know.

15           Q.    Are you at liberty to tell us what those  
16   companies are?

17           A.    I'd rather not.

18           Q.    What level of interest or how serious have  
19   these inquiries been by these other companies?

20           A.    I'm not sure how to gauge the seriousness.  
21   Sorry.

22           Q.    Let me rephrase the question.

23           A.    Thank you.

24           Q.    Have these companies expressed definite  
25   interest in doing that or is it just kind of, "Well,

1 maybe we'd like to do it, we don't know"? Where does  
2 it fall in that spectrum?

3 A. Yeah, the contact that I've had --  
4 typically, I've had more contact with, I guess I would  
5 say, consultants. So other geoscientists. It has  
6 ranged from, "Hey, I've got a client that's kind of  
7 interested, what do you know," and I'll send them the  
8 report that we've got and show them where some of our  
9 database links are and things like that.

10 It's ranged from that level of interest to,  
11 "We've signed a" -- "We've been contracted by a  
12 company within the state of Iowa to look at the  
13 feasibility of carbon sequestration in Iowa."

14 Q. Have any ethanol plants talked with the  
15 Geologic Survey about sequestering in Iowa rather than  
16 piping the carbon dioxide to some other state?

17 A. Yes, they have.

18 Q. So that seems to be a feasible option for  
19 ethanol plants, do you think?

20 A. Yeah, I think so.

21 Q. Have you talked with Summit Agricultural  
22 Group about carbon sequestration in Iowa?

23 A. Yeah, that was included in my testimony.  
24 My written testimony.

25 Q. Can you tell us more about those

1 discussions? When they were, what resulted from those  
2 discussions.

3 A. In my written testimony, I think I gave the  
4 date of our first contact. Bear with me just a  
5 second, please.

6 It would have been July 9th of 2020 was the  
7 first time I was reached by phone from somebody with  
8 Summit Agricultural Group. And they had requested a  
9 virtual meeting, which we held the next day on  
10 July 10th, and that was myself and my supervisor Keith  
11 Schilling.

12 And we gave them -- it was just one person  
13 actually. It was a Zoom meeting. So we gave a  
14 PowerPoint presentation very similar to the one that  
15 was submitted as -- I don't know which exhibit number  
16 it was. But the same information that we've got here.

17 Q. Is that the same PowerPoint that was or  
18 shown to the Iowa House Environmental Protection  
19 Committee last spring?

20 A. It was very similar, yes.

21 Q. So, when you talked to Summit Ag Group, who  
22 was it that you talked to specifically?

23 A. His name was Jon Probst.

24 Q. And it was Summit Agricultural Group and  
25 not Summit Carbon Solutions; correct?

1 A. Correct.

2 Q. So was there any follow-up to that or any  
3 further interest?

4 A. Yes, there was some follow-up questions  
5 that I answered via email. I think we may have spoken  
6 on the phone also a few more times.

7 Q. Has there been any follow-up more recently  
8 with Summit? Either Summit Ag or Summit Carbon  
9 Solutions?

10 A. Not recently, no.

11 Q. If your agency were given enough funding,  
12 which is always questionable, to do an investigation  
13 of carbon sequestration in Iowa, what would be  
14 involved and how long would that take?

15 A. Of course that depends on how much funding  
16 we're talking about, but let's go with an ideal  
17 scenario.

18 To characterize, let's say, one site that  
19 would -- say the size of a typical ethanol plant. We  
20 would start there and say this is our spot where we  
21 want to focus our activities.

22 I would say it would take, you know, as  
23 quickly as two years, maybe two to four years I would  
24 safely say, to get to the point where we can identify  
25 absolutely, yes, we can store at this location or we

1 cannot. So, yeah, I would say two to four years.

2 And, you know, funding-wise, that would  
3 probably range -- I've given estimates in the past.  
4 There's some that are part of the exhibits. I wish I  
5 could nail it down to exactly that, but it could be on  
6 the order of three to five million dollars, certainly  
7 up from there, depending on what you do.

8 Q. And that would need to come from the  
9 legislature? The funding?

10 A. Are you asking me if that's where I want it  
11 to come from?

12 Q. Well, would it come from the legislature?

13 A. It could.

14 Q. What other source might there be?

15 A. The federal government has grants out there  
16 that are available for this type of research.  
17 Obviously, you know, if an ethanol company wanted to  
18 go on their own and hire us, we could go that route.  
19 There's a number of different routes.

20 Q. Finally, on page 10, line 13, of your  
21 testimony, I wasn't quite clear what you were saying  
22 there.

23 MR. TAYLOR: If we can get that up.

24 A. That's a question.

25

1 BY MR. TAYLOR:

2 Q. Oh. The question mentions "13 sites." How  
3 does the 13 sites fit into what we've just been  
4 talking about as far as exploration for a  
5 sequestration site?

6 A. These questions were provided to me by  
7 Representative Isenhardt. As to where he came up with  
8 the question, I couldn't speak to that.

9 Q. So I should have asked him.

10 A. I suppose so.

11 MR. TAYLOR: That's all the questions I  
12 have. Thank you.

13 BOARD CHAIR HELLAND: I had Mr. Whipple  
14 next. I apologize if I missed Mr. Jorde.

15 MR. WHIPPLE: I'll go.

16 CROSS-EXAMINATION

17 BY MR. WHIPPLE:

18 Q. Mr. Clark, let's go back to -- you  
19 described a meeting with Summit. And it was one  
20 person?

21 A. Yes.

22 Q. Mr. Probst. Do you recall Mr. Probst  
23 identifying his position in the company?

24 A. I don't recall off the top of my head, no.

25 Q. I may not get the title right, but I

1 believe there was testimony in this proceeding that he  
2 was the chief financial officer. I guess my question  
3 is did you have a clear understanding that you weren't  
4 speaking to a scientist or an engineer?

5 A. Yes, I knew that.

6 Q. Okay. And so -- you've provided this  
7 information now to the legislature; right?

8 A. Correct.

9 Q. And to other companies; right? You won't  
10 identify which, but to other companies.

11 A. Yes.

12 Q. And the answer has been the same every time  
13 from you; is that right? That it's possible.

14 A. Correct.

15 Q. Do you have a sense of the capacity of Iowa  
16 for this storage? Is there a limit on the capacity  
17 here?

18 A. I mean, the numbers that we have is, again,  
19 based on very limited data and some very wide-ranging  
20 assumptions. So the end values that we can come up  
21 with are so wide ranging. But they're non-zero.

22 Q. I guess I'd like to zero it -- well, I  
23 guess I'd like to get to a little bit more than  
24 non-zero.

25 Summit is proposing to capture carbon from



1 more than 30 ethanol plants. Is there capacity in  
2 Iowa for that much carbon?

3 A. An average Iowa ethanol plant emits how  
4 many metric tons of CO2 per year? Do we want to say  
5 300,000? 400,000?

6 Q. I'm interested in what you told Summit, I  
7 guess. Did you tell them there was capacity for the  
8 scope of their project?

9 Did they identify the scope of their  
10 project, first of all, I should ask?

11 A. I said that there's -- all right. So let's  
12 look at whatever exhibit is the PowerPoint  
13 presentation. Maybe it's best to go this route.

14 So the total that I had come up with, and  
15 this is just me trying to cobble things together, I  
16 believe was, at the time that I made this  
17 presentation, about 12.8 million metric tons of CO2  
18 per year. And that's from all Iowa ethanol -- or that  
19 was with the figure that we would produce about  
20 4.5 billion gallons of ethanol per year. So round  
21 that up to 13 million metric tons per year.

22 Do I think that we could store that in  
23 Iowa? Based on what I know right now, I think it's  
24 possible.

25 Q. So I guess what I'm really driving at here

1 is Summit's petition and evidence submitted in this  
2 docket identifies North Dakota as the only feasible  
3 site and states that there is not geologic feasibility  
4 in Iowa. And obviously your testimony directly  
5 contradicts that.

6 So I guess I'd like you to explain how you  
7 account for that based on your conversations with them  
8 and the opinions you've now provided to many about the  
9 feasibility of this.

10 How do you account for the difference?

11 A. I really have no idea how Summit came to  
12 that conclusion. So I can't speak to that.

13 But, again, I can just point to the  
14 evidence that we have, which is very well summarized  
15 in our Technical Information Series No. 58 that I  
16 believe was part of the -- I can't remember if that's  
17 been submitted as an exhibit or not.

18 Q. If it's not a geologic reason, would it be  
19 possible for it to be a business reason? Or a  
20 financial reason.

21 A. That's beyond my area of expertise.

22 MR. WHIPPLE: That's all I have, Your  
23 Honor.

24 BOARD CHAIR HELLAND: Thank you.

25 Mr. Jorde.

1 MR. JORDE: Thank you.

2 CROSS-EXAMINATION

3 BY MR. JORDE:

4 Q. Picking up on that question that Mr. Taylor  
5 asked to be displayed up there. The question was "If  
6 Summit Carbon Solutions were interested in  
7 characterizing 13 sites for its contracted carbon  
8 dioxide emitters, the cost could be \$52 million or  
9 possibly more; correct?"

10 And you said "Correct."

11 Now, are you proposing that there would be  
12 individual storage location per site or is there  
13 likely a location in Iowa generally that could capture  
14 all 13? What's the breakdown?

15 A. So, based on my experience in, you know,  
16 working with the Midwest Regional Carbon Initiative,  
17 which is a regional consortium of 22, I think, states,  
18 21 or 22 states, where we -- the point at the MRCI is  
19 to accelerate CCUS throughout our region.

20 And that has to do with both compiling all  
21 the research, the data that we've gotten across the  
22 states that's available. And partnering with that  
23 consortium and attending meetings, and then also  
24 talking to other state surveys like in Kansas and  
25 Illinois and some of these places that have already

1 had active carbon sequestration, I've come up with,  
2 you know, a fairly firm understanding that there's two  
3 ways that we could do this.

4 There's the real large-scale commercial  
5 hub. Which is a term that gets thrown around quite a  
6 bit in the CCS industry. The idea of gathering as  
7 much CO2 as you can from a geographic region and  
8 finding a hub nearby that you can then store it all  
9 in.

10 I don't see that as necessarily the only  
11 way that this should be approached. I feel like you  
12 could do smaller, more distributed carbon  
13 sequestration where perhaps there is just a single  
14 ethanol plant that is able to store its own emissions  
15 and that's it. Four hundred, five hundred thousand  
16 tons a year. So anywhere from there to the  
17 large-scale 10 million metric tons per year.

18 I think, at least in terms of the state of  
19 Iowa, all those options should be investigated.

20 Q. So, based on the geological information you  
21 have, the best information, you believe there's likely  
22 localized solutions as well as potentially formation  
23 in Iowa appropriate to handle more of a large-scale  
24 sequestration project?

25 A. Yes.

1           Q.   And is there a particular county, or  
2   counties, that you believe geologically would best be  
3   suited to handle larger volumes from multiple sources?

4           A.   Again, without knowing for sure that we can  
5   do this in any one particular or multiple formations,  
6   I just don't know. I know where the formations are  
7   that I think are the highest potential.

8           Q.   Yes.

9           A.   I have to use my words here.  
10   Essentially -- there's a feature called the  
11   Midcontinent Rift System. And it comes into the state  
12   from the southwest sort of corner, and then it runs up  
13   through and exits Iowa through the north central part.  
14   This geologic feature continues up into Minnesota  
15   underneath Lake Superior and down around into  
16   Michigan.

17                   So it's a very large feature. It underlies  
18   at least 30, 35 percent of the state of Iowa. And we  
19   know it's there. We don't know in detail what its  
20   carbon sequestration potential is right now, but,  
21   based on the information we do have, it's something  
22   that I think is worth looking at.

23                   And, because it's so vast, it's really hard  
24   for me to pinpoint which area is going to be the best  
25   potential.

1           Q.    In southwestern Iowa where you say this  
2   formation enters the state, are you aware if there's  
3   any significant oil or gas production activities going  
4   on in that region also?

5           A.    There are no petroleum activities in Iowa.  
6   As far as I know.

7           Q.    Okay.  So do you understand that where  
8   Summit is proposing to sequester in North Dakota is  
9   some approximately 40 miles from a large production of  
10  natural gas and crude oil?

11          A.    Yes, I'm aware of that.

12               MR. JORDE:  Thank you.  Nothing further.

13               BOARD CHAIR HELLAND:  Thank you.

14               Board questions?

15               BOARD MEMBER BYRNES:  Just a couple quick  
16  questions.

17               So are you aware of the work that the  
18  National Energy Technology Laboratory does in this  
19  arena?

20               THE WITNESS:  I'm somewhat familiar, yes.

21               BOARD MEMBER BYRNES:  Would that be a  
22  facility you would use to do the testing of the  
23  samples?  The core samples?

24               THE WITNESS:  In my experience in preparing  
25  a proposal to do this type of research using

1 Department of Energy funding, it seems to be customary  
2 or certainly beneficial to partner with the national  
3 lab. NETL is the only national lab operated by the  
4 Department of Energy. So they end up on a lot of  
5 these -- actually, I take that back. I don't think  
6 NETL can be a part of a DOE grant. So let's just  
7 assume that I'm not sure how that affiliation is.

8 But, yes, NETL does do a lot of testing  
9 related to carbon sequestration. But it kind of  
10 depends. I mean, if I'm looking at basaltic  
11 mineralization, then there's another national lab, I  
12 believe it's called Northwest National Labs, that has  
13 been doing quite a bit of research in basaltic  
14 mineralization, so that might be a better lab to  
15 partner with.

16 So it kind of depends.

17 BOARD MEMBER BYRNES: So, from your  
18 professional standpoint, what is it that we need to  
19 have in Iowa and how does the process work. Just kind  
20 of layman's terms, what do we need to have and then  
21 how is it sequestered, how is it kept there?

22 THE WITNESS: So, just to clarify, you're  
23 asking what properties of the formations are needed  
24 to -- okay.

25 So it boils down to porosity and

1 permeability in most cases. So think of a sponge.  
2 Some rocks actually behave like sponges. And a sponge  
3 can absorb water because it has open pore spaces  
4 within it that the water can sit in. And you can  
5 wring the sponge out because those pore spaces are  
6 connected.

7 So how a fluid can move from one pore space  
8 to another is its permeability. The higher your  
9 porosity, the higher your permeability, the more fluid  
10 that rock can hold. So that's one thing that you need  
11 to look for are formations that have high porosity,  
12 high permeability.

13 In the case of carbon sequestration,  
14 typically the CO2 is captured as a gas and then it's  
15 dehydrated and compressed into what's called a  
16 supercritical fluid. This fluid needs to be under a  
17 certain amount of pressure. And that relates to  
18 injecting at least 2,700 feet underground to maintain  
19 it as a liquid so that it doesn't depressurize and  
20 turn back into a gas phase and therefore potentially  
21 leak.

22 So keeping the depth in mind and porosity  
23 and permeability, those are kind of your constraints.

24 To go a step further, when you're talking  
25 about rock formations that are porous and permeable,



1 those tend to be aquifers. They hold groundwater.

2 One of the requirements for evaluating if a  
3 rock formation can be utilized for carbon  
4 sequestration is whether the groundwater that's within  
5 that aquifer could ever be used for drinking. So is  
6 it potable water or not.

7 The EPA has set a limit of 10,000 parts per  
8 million of total dissolved solids. And that's a  
9 standard water quality parameter that essentially  
10 refers to the salinity. How many different minerals  
11 are dissolved in that water. 10,000 parts per million  
12 and higher, that's water that nobody would ever want  
13 to drink. So, once you find a formation that's deep  
14 enough, porous and permeable enough, then it also  
15 cannot have water that's considered potable.

16 So you have to look for those factors.

17 And then the side bar that I touched on  
18 earlier is there's a slightly different formation that  
19 you can look at. Which are igneous rocks. They're  
20 not -- they're rocks that were magma. They may have  
21 been erupted at the land surface. Which would be  
22 known as basalt.

23 Turns out a lot of research has been going  
24 into what happens when you inject supercritical CO2  
25 into basalt formations. When that happens, studies

1 have shown that the supercritical CO2 actually  
2 converts to the mineral calcite. Or ankerite or some  
3 type of mineral. And those minerals have been proven  
4 to be very stable in the rock formation.

5 So this idea of basaltic mineralization is  
6 picking up some attention and some speed. It turns  
7 out that the Midcontinent Rift System that I talked  
8 about earlier has a -- a very large portion of it is  
9 occupied with basalts.

10 BOARD MEMBER BYRNES: So, in reading  
11 through your testimony, one of the things that stuck  
12 out with me is just the cost. The cost per bore.

13 Why? I mean, if you can explain that a  
14 little bit. Why it's so expensive.

15 THE WITNESS: Sure. Drilling to assess  
16 whether you can do sequestration requires, again, a  
17 tremendous depth. Drilling 2,700 feet deep even for a  
18 water well is a pretty big undertaking and fairly  
19 expensive.

20 But this isn't just to make a hole in the  
21 ground. This is we have to retrieve samples, solid  
22 cylindrical core samples, of different rock formations  
23 so that we can subject them to laboratory testing. So  
24 that adds a lot of cost to it when you're drilling  
25 four, five, six thousand feet down and you're trying

1 to retrieve solid cylinders of core that can be tens  
2 of feet long. It takes a specialized drill rig,  
3 different capabilities, things like that. So that's a  
4 pretty big expense.

5 And then what's folded into those costs is  
6 usually the down-hole analyses that are done. So  
7 instruments can be lowered down the hole once it's  
8 been drilled, and these instruments can collect a  
9 myriad of data that's very useful. Such as the  
10 porosity and permeability. It can identify different  
11 changes in lithologies that maybe you didn't see  
12 during the drilling process. It can give you  
13 information about the water chemistry, the water  
14 temperature. It can even look for things like faults  
15 in the area.

16 So the down-hole and analytical part can  
17 add a lot of cost to it as well.

18 BOARD MEMBER BYRNES: As a person who  
19 taught earth science back in the day, I better end it  
20 right now. Otherwise we may continue. So thank you.

21 THE WITNESS: You're welcome.

22 BOARD MEMBER MARTZ: So, Mr. Clark, again,  
23 on the boring and the work to characterize these  
24 sites, you mentioned three to five million dollars in  
25 two to four years, I believe, to characterize a site.

1                   At the end of that two to four years, are  
2   you saying that that site is ready for commercial  
3   injection or is there another step after that?

4                   THE WITNESS: Those figures would probably  
5   get you to the point where you're going to -- I  
6   suppose it's possible that that could get you past the  
7   injection testing part to where you're actually  
8   putting it online as a commercially viable well.

9                   But I think the conservative estimation  
10   would be that would get you to the point where you've  
11   applied for an underground injection permit, a  
12   Class VI permit with the EPA, to do injection testing.  
13   And those costs I'm far less familiar with. But those  
14   would be additional costs, additional time.

15                  BOARD MEMBER MARTZ: And, just to clarify,  
16   do you know of any current characterization going on  
17   right now for any of those sites in Iowa?

18                  THE WITNESS: I am not aware of any active  
19   carbon sequestration characterization projects in  
20   Iowa.

21                  BOARD MEMBER MARTZ: Thank you.

22                  THE WITNESS: Let me qualify that. That  
23   involve drilling.

24                  BOARD CHAIR HELLAND: Thank you.

25                  Representative Isenhardt. Redirect?

1 MR. ISENHART: Thank you.

2 REDIRECT EXAMINATION

3 BY MR. ISENHART:

4 Q. Just three questions to clarify your  
5 responses to others.

6 If I were to tell you the "13" in that one  
7 question is based on the number of ethanol plants that  
8 Summit proposes to serve, would that explain that  
9 number in that question?

10 A. It explains it to me, yes.

11 Q. Okay. And you testified that the cost  
12 would be three to five million or more. I took the  
13 average. Four. Thirteen times four equals 52. So  
14 that's why you responded 52 million or more in that  
15 question?

16 A. Yes.

17 Q. You were asked about the private parties  
18 who have approached you. You said you wouldn't  
19 identify them by name, but is it true your testimony  
20 generally refers to them as biofuels, power  
21 generation, fertilizer, and cement production  
22 industries?

23 A. Well, the question I was responding to, I  
24 thought, was asking me about the consulting companies  
25 that were hired to do work. Unless I misunderstood

1 that.

2 Q. Well, let's say it was asking you about the  
3 identities of the industries wanting to know. That's  
4 in your testimony what those industries are?

5 A. Yes. Yes. It says that in my testimony.

6 Q. Thank you. And the last question is you  
7 were asked about storage fields, where they might be,  
8 how big they might be.

9 Is it true that another factor is not just  
10 the location and size of the storage fields but the  
11 number of wells that might be needed to get carbon  
12 dioxide into that storage facility?

13 A. Correct.

14 Q. And what would that, in general, involve  
15 for an average ethanol plant? Number of specific  
16 wells.

17 A. You know, obviously I don't think that you  
18 would be -- I don't think that you would want to rely  
19 on characterizing a site fully with just one well.  
20 You know, in some of the cases that I've heard that  
21 have worked in other states, you drill your first well  
22 to gather all your data. And then, when it comes time  
23 to do injection testing, you drill a second well and  
24 construct it in such a way that it can eventually be  
25 converted into a permanent injection well. So you'd

1 need at least two.

2 Q. So there may be multiple wells associated  
3 with an individual ethanol plant's storage field?

4 A. Yes.

5 Q. The last question is what do those wells  
6 look like on the surface to the average person? Would  
7 you say that they are significant features of the  
8 landscape or would they be kind of hidden as far as  
9 the public is concerned?

10 A. To qualify my answer before I give it, I  
11 have not seen a carbon sequestration injection well in  
12 person. I've seen photos of them in various  
13 presentations. They don't look like they're large  
14 monstrosities. They look like they have a few feet of  
15 steel coming out of the ground that might elbow off to  
16 the side and there might be a small structure next to  
17 it. From my recollection of seeing photos of it.

18 Q. But is it fair to say there would be some  
19 flexibility where to locate them in a specific area if  
20 it was in a rural area to get to a particular storage  
21 field?

22 A. Yes, I would say that it's reasonable to  
23 say that there is some flexibility with the location  
24 of the wells.

25 MR. ISENHART: Thank you.

A horizontal bar chart consisting of 20 black bars. The bars are arranged vertically, with their lengths representing a distribution of data. The lengths vary significantly, with some bars being very short (around 10% of the chart width) and others being nearly full (around 90% of the chart width). The bars are arranged in a single column, with no labels or axes visible.



1 C E R T I F I C A T E

2 I, the undersigned, a Certified Shorthand  
3 Reporter of the State of Iowa, do hereby certify that  
4 I acted as the official court reporter at the  
5 proceedings in the above-entitled matter at the time  
6 and place indicated; that I took in shorthand all of  
7 the proceedings had at the said time and place and  
8 that said shorthand notes were reduced to typewriting  
9 under my direction and supervision, and that the  
10 foregoing typewritten pages are a full and complete  
11 transcript of the shorthand notes so taken.

12 Dated this 7th day of October, 2023.

13

14

15

*Melissa A. Burns*

16

CERTIFIED SHORTHAND REPORTER  
Melissa A. Burns, Iowa CSR #527

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