

Transcript of the Testimony of

**Dr. Bernard Kueper**

November 22, 2022

AUGUST J. LEVERT, JR. FAMILY LLC, ET AL.  
AMERICA PRODUCTION COMPANY

v. BP



P.O. Box 1554 • Hammond • Louisiana 70404  
**(Toll Free) 866.870.7233 • 985.542.8685 • (Fax) 985.419.0799**  
office@amersonwhite.com • www.amersonwhite.com

1

18TH JUDICIAL DISTRICT COURT  
PARISH OF ST. MARY  
STATE OF LOUISIANA

NO: 78953                      DIVISION "A"

AUGUST J. LEVERT, JR. FAMILY LLC, ET AL.  
VERSUS  
BP AMERICA PRODUCTION COMPANY  
\*\*\*\*\*

VIDEOTAPED DEPOSITION OF  
DR. BERNARD KUEPER  
TAKEN VIA VIDEOCONFERENCE  
ON TUESDAY, NOVEMBER 22, 2022, AT 9:00 A.M.

2

1 APPEARANCES:  
2  
3 REPRESENTING PLAINTIFFS:  
4 JONES SWANSON HUDDPELL & DASCHBACH LLC  
5 BY: KEVIN HUDDPELL, ESQUIRE  
6 BY: JOHN ARNOLD, ESQUIRE  
7 601 Poydras Street  
8 Suite 2655  
9 New Orleans, Louisiana 70130  
10 Email: Khuddell@jonesswanson  
11  
12 REPRESENTING DEFENDANTS:  
13 LISKOW & LEWIS  
14 BY: JOHN S. TROUTMAN, ESQUIRE  
15 BY: DENICE REDD-ROBINETTE, ESQUIRE  
16 BY: JAMIE D. RHYMES, ESQUIRE  
17 BY: COURT C. VANTASSELL, ESQUIRE  
18 822 Harding Street  
19 Lafayette, Louisiana 70507  
20 Email: jtroutman@liskow.com  
21  
22  
23  
24 VIDEOED BY: BILL MYERS, CLVS  
25 REPORTED BY: ANNA COATES, CCR, RPR

3

I N D E X

1	EXAMINATION BY:	PAGE
2	Mr. Huddell.....	5
3		
4	REPORTER'S CERTIFICATE.....	63
5		
6		
7		
8		
9		
10		
11		
12	E X H I B I T I N D E X	
13	NO.            DESCRIPTION                      PAGE	
14	EXHIBIT 1    Tab 9, Kueper Résumé.....	6
15	EXHIBIT 2    Tab 7, Appendix L.....	9
16	EXHIBIT 3    Tab 4, Appendix B.....	20
17	EXHIBIT 4    Tab 13, RECAP Document.....	38
18	EXHIBIT 5    Kueper Invoices.....	56
19		
20		
21		
22		
23		
24		
25		

4

S T I P U L A T I O N

1  
2  
3 IT IS STIPULATED AND AGREED by and among  
4 counsel for the parties hereto that the deposition  
5 of the aforementioned witness may be taken for all  
6 purposes permitted within the Louisiana Code of  
7 Civil Procedure, in accordance with law, pursuant  
8 to notice;  
9  
10 That the formalities of reading, signing,  
11 sealing, certification and filing are specifically  
12 NOT waived;  
13  
14 That all objections, save objections as to  
15 the form of the question and responsiveness of the  
16 answer, are reserved until such time as this  
17 deposition, or any part hereof, is used or sought  
18 to be used in evidence.  
19  
20 \* \* \* \* \*  
21  
22 ANNA COKER COATES, RPR, CCR, Certified Court  
23 Reporter in and for the State of Louisiana,  
24 officiated in administering the oath to the  
25 witness.

5

1 THE VIDEOGRAPHER: This is the  
 2 videotaped deposition of Bernard Kueper.  
 3 This deposition is being held via Zoom on  
 4 November 22nd, 2022, at the time indicated on  
 5 the video screen, which is 9:02 a.m.  
 6 Would counsel please introduce  
 7 themselves.  
 8 MR. HUDDALL: Kevin Huddell and John  
 9 Arnold on behalf of the Plaintiffs.  
 10 MR. TROUTMAN: John Troutman, Jamie  
 11 Rhymes, Court VanTassell, and Denice  
 12 Redd-Robinette on behalf of BP America  
 13 Production Company.  
 14 (WHEREUPON,  
 15 DR. BERNARD KUEPER,  
 16 AFTER HAVING BEEN FIRST DULY SWORN BY THE  
 17 ABOVE-MENTIONED COURT REPORTER, DID TESTIFY AS  
 18 FOLLOWS)  
 19 EXAMINATION BY MR. HUDDALL:  
 20 Q. Good morning, Dr. Kueper. How are you  
 21 today?  
 22 A. I'm well. And yourself?  
 23 Q. Doing fine.  
 24 Could you please state your full name for the  
 25 record?

7

1 most recent résumé?  
 2 A. It does, yes.  
 3 Q. Okay. Within this résumé, do you have a  
 4 listing of cases in which you've testified?  
 5 A. I'm trying to remember if that's part of  
 6 this document; my résumé, that is. If it is, it  
 7 will be either page 2 or the last page. I do  
 8 remember going through and making sure my list of  
 9 cases was up to date, and provided that to Liskow.  
 10 So if you go to the very end of the document --  
 11 oh, let's see -- be about page 43 or something. I  
 12 don't know. If it's not there, it's a separate  
 13 submission. I remember we sent those in to, I  
 14 think, to Mr. Troutman.  
 15 Q. Okay. Let me see if we have that.  
 16 MR. TROUTMAN: Kevin, it is a separate  
 17 submission.  
 18 MR. HUDDALL: Oh, okay.  
 19 MR. TROUTMAN: It's entitled "List of  
 20 cases in which Dr. Kueper has testified as an  
 21 expert at trial or deposition in the last  
 22 four years."  
 23 MR. HUDDALL: Oh, so you were trying to  
 24 obscure it.  
 25 MR. TROUTMAN: Right.

6

1 A. Yes. Bernard Kueper, K-U-E-P, as in  
 2 Paul, E-R.  
 3 Q. Where do you reside?  
 4 A. I live in Kingston Ontario, Canada.  
 5 Q. Where are you physically today?  
 6 A. In my home office in Kingston.  
 7 Q. Okay. How are you currently employed?  
 8 A. I'm a professor emeritus at Queen's  
 9 University here in Kingston. And I also have a  
 10 consulting company, B. Kueper & Associates,  
 11 Limited.  
 12 Q. What is your role with respect to that  
 13 company?  
 14 A. I own the company --  
 15 Q. Do you have any --  
 16 A. -- consulting practice.  
 17 Q. Do you have any co-owners of the  
 18 company?  
 19 A. No.  
 20 MR. HUDDALL: Bill, I'd like to pull up  
 21 his résumé, which is Tab 9. We'll mark this  
 22 as Exhibit 1.  
 23 (EXHIBIT 1 IDENTIFIED)  
 24 EXAMINATION BY MR. HUDDALL:  
 25 Q. Dr. Kueper, does this appear to be your

8

1 MR. HUDDALL: We'll try to grab that at  
 2 a break.  
 3 MR. TROUTMAN: Kevin, try Bates Label  
 4 139 of Dr. Kueper's production.  
 5 MR. HUDDALL: Okay. We'll grab that.  
 6 Also, we were trying to find invoices.  
 7 Were you able to find that?  
 8 MR. TROUTMAN: Yes. We'll be  
 9 circulating those shortly. We're getting  
 10 those Bates labeled right now.  
 11 MR. HUDDALL: Okay, great.  
 12 EXAMINATION BY MR. HUDDALL:  
 13 Q. When were you first involved in this  
 14 case; when were you first asked to be involved in  
 15 this case that we're here for today?  
 16 A. I would have to check, but I believe  
 17 it's on the order of five, six months ago. But I  
 18 need to verify that if that's super important.  
 19 Q. What were you asked to do?  
 20 A. To take a look at the data and provide  
 21 an appendix to HET's report, my opinions regarding  
 22 viable remediation methods for the site, for the  
 23 Levert property.  
 24 MR. HUDDALL: Okay. I'd like to mark as  
 25 Exhibit 2 your Appendix L, which I think is

9	<p>1 Tab 7.                  2 (EXHIBIT 2 IDENTIFIED)                  3 EXAMINATION BY MR. HUDDLELL:                  4 Q. Does this appear to be a copy of your                  5 report for this case?                  6 A. If you scroll down to the next page,                  7 please. I just see the cover page, HET appendix                  8 cover page.                  9 Yes, there it is. Yes. That's got our                  10 signatures on it, sure.                  11 Q. Okay. Now, this is also signed by                  12 Dr. West. Who is he?                  13 A. Dr. West is employed by B. Kueper &amp;                  14 Associates. He and I have worked together for, I                  15 want to say, about 12 years now. So he's an                  16 employee.                  17 Q. Okay. Are there any opinions in this                  18 report that I should talk to Dr. West about                  19 instead of you?                  20 A. I don't think so. He prepared it.                  21 Q. Okay. What did he assist you with?                  22 A. Well, Dr. West takes a look, initial                  23 look, at the data. He and I talk about it. And                  24 sometimes he does initial draft of paragraphs and                  25 documents, and then I edit and review. So we work</p>	10	<p>1 closely together on these types of things.                  2 Q. Were you involved in the Iberville                  3 Parish School Board case?                  4 A. No.                  5 MR. HUDDLELL: Okay. Let's go to PDF                  6 page 3, Bill, of the report.                  7 EXAMINATION BY MR. HUDDLELL:                  8 Q. And in particular, in the middle of the                  9 second paragraph, you write, "Laboratory measured                  10 vertical hydraulic conductivities in clay ranged                  11 from 4.0 times 10 to the negative 8 centimeters                  12 per second to 1.4 times 10 to the negative                  13 7 centimeters per second at the IPSB property."                  14 And you reference HET 2016, correct?                  15 A. Correct.                  16 Q. Do you know how those conductivities                  17 were calculated?                  18 A. I believe they were measured in the lab.                  19 So HET went up there, and they took some soil                  20 core. And then they preserved the core, and then                  21 they would send it to -- we've got the lab report.                  22 I don't know if it was Cooley or who it was, but                  23 there was a lab that they used. So they're intact                  24 samples, and those are measured by a lab.                  25 Q. Okay. And so based on that, I believe,</p>
11	<p>1 you then write, geometric mean horizontal -- no,                  2 okay. So that's vertical hydraulic conductivity.                  3 The next sentence is, "Geometric mean                  4 horizontal hydraulic conductivities were derived                  5 from slug tests in monitoring wells screened                  6 across predominantly silty layers on the IPSB                  7 property, and ranged from 4.6 times 10 to the                  8 negative 5 centimeters per second to 1.4 times 10                  9 to the negative 4 centimeters per second."                  10 Is that right?                  11 A. That's correct.                  12 Q. Okay. And so how are those values                  13 calculated?                  14 A. Those are calculated based on slug                  15 tests, as mentioned in this sentence. So a slug                  16 test is where you either add water or remove water                  17 from a monitoring well, and then you allow the                  18 water level inside the well to recover with time.                  19 And that rate of recovery can be used to calculate                  20 the hydraulic conductivity of the geologic                  21 materials that are screened across that -- or that                  22 are across the screen of that monitoring well.                  23 Q. The slug test that ICON performed, were                  24 those performed on the IPSB property or on the                  25 Levert property?</p>	12	<p>1 A. The IPSB property.                  2 Q. Okay. And so when you look at the                  3 vertical hydraulic conductivity versus the                  4 horizontal conductivity, does that tell you                  5 anything about the groundwater flow?                  6 A. Well, first of all, the vertical                  7 hydraulic conductivities that we talked about in                  8 the previous sentence, those were from clay                  9 samples. So I would expect those numbers to be                  10 lower than the slug test values, because the slug                  11 test values were done in monitoring wells screened                  12 across predominantly silty layers. So they're a                  13 couple of magnitude -- two orders of magnitude                  14 higher, which is completely expected.                  15 Overall, these two sets of numbers, the clay                  16 and the silt hydraulic conductivities, tell me                  17 that this is a low hydraulic conductivity geologic                  18 setting, which is completely consistent with the                  19 boring logs; in other words, silts and clays don't                  20 have a lot of conductivity, and that tells me that                  21 the groundwater is not going to flow very fast                  22 through those materials.                  23 Q. So you write, "Groundwater elevation                  24 contour maps prepared by ICON and HET indicate                  25 that the direction of the shallow groundwater flow</p>

13

1 is variable with a horizontal component of  
 2 hydraulic gradient of approximately .005 or less."  
 3 Is that right?  
 4 A. That's correct.  
 5 Q. That gradient, that's a unitless  
 6 measurement; is that right?  
 7 A. Correct.  
 8 Q. Okay. Then you write, "The shallow  
 9 groundwater velocity at the site is estimated to  
 10 be approximately 2.4 feet per year or less,"  
 11 correct?  
 12 A. Yes.  
 13 Q. And how did you come up with that value  
 14 of 2.4 feet per year?  
 15 A. That is what's known as Darcy's law, the  
 16 well-established empirical relationship within the  
 17 groundwater profession. And Darcy's law utilizes  
 18 hydraulic conductivity as an input parameter, and  
 19 it also utilizes the hydraulic gradient of 0.005  
 20 as the -- an input parameter. Pardon me.  
 21 Q. Okay. Is that a directionless  
 22 measurement, the 2.4 feet per year?  
 23 A. No. You would use those hydraulic  
 24 conductivity values from the slug test, and then  
 25 you'd say, okay, my hydraulic gradient is

15

1 can also vary in time, as well as spatially.  
 2 Q. Okay. So for some months of the year,  
 3 it could be traveling west at that 2.4 feet per  
 4 year rate. But then some other months of the  
 5 year, it might start traveling east 2.4 feet per  
 6 year?  
 7 A. Well, that's hypothetical, right, the  
 8 way you asked that question. We have to go look  
 9 at the groundwater elevation maps to make this a  
 10 site-specific conversation, if you want.  
 11 Q. Well, just conceptually, when you say  
 12 that the flow is variable, you're talking about  
 13 the direction of the flow, right?  
 14 A. Correct. Yes, that's right.  
 15 Q. All right. So it can be going one  
 16 direction at a certain rate, and then it can -- or  
 17 at the rate that you suggested, and then it could  
 18 go the opposite direction at the same rate; is  
 19 that right?  
 20 A. Well, again, I'm not sure about the word  
 21 "opposite," but it can go -- the groundwater  
 22 overall could be flowing in a particular direction  
 23 on a portion of the site. And on a different  
 24 portion of the site, the groundwater may be  
 25 flowing a different direction. In other words,

14

1 unitless, but it does have direction. So you  
 2 would say the 005 was in that direction, in that  
 3 direction, as well, and that's the direction that  
 4 you get the 2.4 feet per year from. This  
 5 calculation is an overall typical value for this  
 6 geologic environment.  
 7 Q. Okay. So what is the direction of the  
 8 2.4 feet per year?  
 9 A. It would be whatever the direction of  
 10 the gradient is. And that you get from the  
 11 groundwater elevation contour maps that are  
 12 mentioned at the beginning of the previous  
 13 sentence.  
 14 Q. Well, and as you said in the previous  
 15 sentence, that direction is variable, correct?  
 16 A. Correct. Yes.  
 17 Q. Okay. So it sometimes is going to be  
 18 flowing one direction, and sometimes another  
 19 direction, right?  
 20 A. I thought you -- okay. What you just  
 21 touched on is that the direction might vary in  
 22 time. I thought we were talking about direction  
 23 spatially. So on one part of the site it may be  
 24 flowing in that direction, another part of the  
 25 site a different direction. But you're right, it

16

1 when I say that it's variable, I didn't mean it  
 2 moves that way one day, and then it moves the  
 3 opposite way the next day. That's not the intent  
 4 of that sentence.  
 5 Q. Well, seasonally, based on, for example,  
 6 the flood or drop conditions of the Atchafalaya  
 7 Basin, correct?  
 8 A. Well, like I said, the groundwater flow  
 9 direction at a particular location can vary -- the  
 10 direction of it can vary in time. At the same --  
 11 I don't want to say the word "time" again, but I  
 12 will. At the same time, you know, for a given  
 13 point in time, given day of the year, month,  
 14 season, at two different locations on the site,  
 15 you could have different flow directions,  
 16 groundwater flow directions.  
 17 Q. Okay. Is it important to any of your  
 18 opinions in this case the direction of the  
 19 groundwater flow?  
 20 A. As a hydrogeologist, direction of  
 21 groundwater flow is usually important, yes. My  
 22 main opinion, as you know, in this appendix is  
 23 suitability of monitored natural attenuation as a  
 24 strategy for this site. And that does not -- the  
 25 use of MNA is not dependent on groundwater flow

17

1 direction.

2 Q. Okay. The use of MNA is not dependent;

3 is that what you said?

4 A. That's what I said, yes, that's right.

5 Q. Is not dependent on groundwater flow

6 direction?

7 A. MNA can work in any direction, that's

8 right.

9 Q. I'm trying to remember from physics. Is

10 velocity, is the term "velocity," is that -- what

11 is it; vector, is that a vectorless term, or does

12 it require direction?

13 A. It's a vector, yes.

14 Q. Okay. So it requires direction, right?

15 A. That's right.

16 Q. Okay.

17 A. It doesn't require direction; it is in a

18 certain direction.

19 Q. Okay. And in this case, you've

20 determined that the direction is variable,

21 correct?

22 A. It can be, yes.

23 Q. Well, at this particular site, it is

24 variable or it's not, right?

25 MR. TROUTMAN: Object to form.

19

1 Q. Okay. So it is variable on the IPSB

2 site, the groundwater flow direction, correct?

3 A. Correct.

4 Q. Okay. So you said the use of MNA is not

5 dependent on the groundwater flow direction. Is

6 it a factor in some way with respect to the

7 propriety of using MNA?

8 A. What do you mean by "propriety of using

9 MNA?" If I could just --

10 Q. Does the groundwater flow direction have

11 any -- let me restate that.

12 Is the groundwater flow direction a factor in

13 determining whether MNA is an appropriate

14 methodology?

15 MR. TROUTMAN: Object to form.

16 THE WITNESS: Not for Levert site, no.

17 I say that because groundwater is moving

18 extremely slowly and really not going

19 anywhere, so to speak. I can say that.

20 MR. HUDDLELL: Bill, can we pull up Tab

21 4. Tab 4 is the figures for -- it's Appendix

22 B. These are your figures. And I wanted to

23 go to figure 16 -- I'm sorry, figure 17,

24 which is on PDF page 18.

25 THE WITNESS: I've got it open on my

18

1 THE WITNESS: Are you referring to the

2 Levert site or the IPSB site?

3 EXAMINATION BY MR. HUDDLELL:

4 Q. Well, let's start with the Levert site.

5 A. Okay. We don't have water level data

6 for the Levert site.

7 Q. Okay. So does that mean we don't know

8 the velocity of the groundwater at the Levert

9 site?

10 A. I think it's pretty -- very reasonable

11 to assume that the velocities are going to be much

12 the same at Levert as IPSB. I mean, those sites

13 are right next to each other. The geology is

14 very, very similar. I'd be shocked if there was a

15 difference in groundwater flow conditions on

16 Levert compared to IPSB.

17 Q. Okay. So you're assuming that -- and

18 you explained why, but you're assuming that the

19 velocity on the Levert site will be the same as

20 the velocity on the IPSB site, correct?

21 A. Yes. Very similar, if not the same.

22 Q. Okay. So then what is the direction of

23 flow on the IPSB site?

24 A. Well, it varies, like we've been talking

25 about.

20

1 screen. It's identical to what you're

2 showing.

3 MR. HUDDLELL: Okay. I can't remember

4 what exhibit we're on. Is this Exhibit 4?

5 THE VIDEOGRAPHER: I'm at 3.

6 MR. HUDDLELL: So Exhibit 3 will be the

7 Appendix B figures.

8 (EXHIBIT 3 IDENTIFIED)

9 EXAMINATION BY MR. HUDDLELL:

10 Q. Is this one of the things you would have

11 looked at in coming up with any of your opinions

12 in this case?

13 A. Definitely looked at it.

14 Q. You looked at it, all right.

15 A. I'm thinking -- pardon me for

16 interrupting. It's a figure like this where we

17 would have gotten the hydraulic gradient from,

18 which then leads to a groundwater velocity.

19 Q. Okay. And so this is, I guess, a

20 snapshot in time, right, October 13, 2015; is that

21 right?

22 A. Yes. I had to look at the date.

23 Q. So what's this show us with respect to

24 groundwater velocity and hydraulic gradient?

25 A. Okay. So the hydraulic gradient, you

21

1 would take the difference in the magnitude of  
 2 these contours, divide by the distance between the  
 3 contours, gets you the hydraulic gradient.  
 4 Q. Okay. So based on this potentiometric  
 5 map and the hydraulic gradient, you -- what would  
 6 you say is the groundwater velocity?  
 7 A. Well, we took the gradient, based on a  
 8 map like this, multiplied it by hydraulic  
 9 conductivity. And then you also have to divide  
 10 all that, that product, by the porosity to get  
 11 your velocity. That, in its entirety, is Darcy's  
 12 law. So without a hydraulic gradient map, you'd  
 13 have to estimate -- sorry, without a groundwater  
 14 elevation map, you would have to estimate the  
 15 hydraulic gradient. But here we have measured  
 16 values.  
 17 Q. Okay. Your report says that the shallow  
 18 groundwater velocity at the site is estimated to  
 19 be approximately 2.4 feet per year or less, right?  
 20 A. Correct.  
 21 Q. If we looked at the -- what would you  
 22 say is the direction, since velocity requires a  
 23 direction component, what's the direction of the  
 24 groundwater flow at this site?  
 25 MR. TROUTMAN: Object to form.

23

1 property to the IPSB property; is that fair?  
 2 A. Based on this date, yes.  
 3 Q. Okay. Would you expect that the  
 4 groundwater between monitoring wells MW4 and MW5  
 5 would actually not be moving at 2.4 feet per year;  
 6 that it would be moving slower than the further,  
 7 you know, east or west of those locations?  
 8 A. I have to go back and check that. I  
 9 mean, we have values of hydraulic head at both 4  
 10 and 5. You could calculate a gradient based on  
 11 those two posted numbers. I don't know what it  
 12 would be. Again, the 2.4 feet per year velocity  
 13 is a typical value for these sites.  
 14 Q. But in between MW4 and MW5, it seems  
 15 like the water is probably going to be pretty much  
 16 standing still, right?  
 17 A. There would be a very small component of  
 18 flow. I would expect it to be pretty weak,  
 19 though, based on this date.  
 20 Q. Right. Is there anything other than  
 21 groundwater flow that would impact -- not impact.  
 22 Let me restate that.  
 23 Is there anything other than groundwater  
 24 flow -- okay, let me try one more time.  
 25 Is there anything other than groundwater

22

1 THE WITNESS: You're asking about the  
 2 Levert site, I take it?  
 3 EXAMINATION BY MR. HUDDLELL:  
 4 Q. Well, let's start with the Levert site.  
 5 A. Okay. It would be to the west.  
 6 Q. Okay. And there's also, I guess -- what  
 7 if we -- is it also to the south, if we moved --  
 8 if we looked at the groundwater in the northern  
 9 most part of that gradient on the Levert property,  
 10 we would have -- and we were right on the property  
 11 boundary, it would be to the south; is that right?  
 12 A. If we're on the western property  
 13 boundary of the Levert site in the northern part,  
 14 it would be to the south, that's right. Then as  
 15 you work your way more eastward, the flow becomes  
 16 completely west, and then you can see a mirror of  
 17 that on the IPSB property.  
 18 Q. Okay. So then on the IPSB property, the  
 19 predominant flow direction is to the east  
 20 probably?  
 21 A. Yes, I would say east. And as you go  
 22 north on that property, as you can see, it's more  
 23 of a southeast component to it.  
 24 Q. Okay. So the direction component of the  
 25 groundwater velocity is different from the Levert

24

1 velocity that would affect whether the chemical  
 2 constituents found in the groundwater are  
 3 migrating one direction or the other?  
 4 MR. TROUTMAN: Object to form.  
 5 THE WITNESS: Did you start that with  
 6 "other than the velocity;" was that your  
 7 question?  
 8 EXAMINATION BY MR. HUDDLELL:  
 9 Q. Yes. Is there something other than the  
 10 velocity of the groundwater itself that would  
 11 factor into the potential for contaminants to move  
 12 in the groundwater?  
 13 MR. TROUTMAN: Object to form.  
 14 THE WITNESS: In general, constituents  
 15 in groundwater will move in the direction of  
 16 the groundwater velocity. And depending on  
 17 what the constituent is, there can be  
 18 processes other than velocity that dictate  
 19 how quickly it moves.  
 20 EXAMINATION BY MR. HUDDLELL:  
 21 Q. Okay. So for example, chlorides, if we  
 22 were finding chlorides at 12,000 milligrams per  
 23 liter at MW4, with this sort of potentiometric  
 24 regime, would you expect there to be movement of  
 25 chlorides to the east and west?

25

1 MR. TROUTMAN: Object to the form.  
 2 THE WITNESS: So are you saying that if  
 3 there's chloride at MW4, you're asking me on  
 4 October 13th, 2015, on that particular day,  
 5 were they moving south?  
 6 Yes. There would also be other  
 7 components of flow, but, in general, there's  
 8 a southerly component of flow there.  
 9 EXAMINATION BY MR. HUDDLELL:  
 10 Q. Okay. What are the other components of  
 11 flow?  
 12 A. You're asking about October 13th, 2015?  
 13 Q. Yes.  
 14 A. Well, predominantly to the south, based  
 15 on these data. If you want to talk about, you  
 16 know, the overall chloride impacts in that general  
 17 area, then you can see that there are other  
 18 directions, as well. But just specifically  
 19 between 4 and 5, looking at those water levels,  
 20 one is minus .24 feet, one is minus .28 feet  
 21 elevation, you see that there's a driving force to  
 22 the south on that date.  
 23 Q. A very slight driving force to the  
 24 south?  
 25 A. Whatever that grading works out to be.

27

1 dispersion?  
 2 A. That's how -- that's right. That's how  
 3 we quantify it in hydrogeology. That's correct.  
 4 They're separate processes in a way, because  
 5 dispersion, most people think of the mechanical  
 6 part. And then diffusion is this other thing, but  
 7 you lump them together mathematically when you  
 8 deal with anything quantitatively.  
 9 Q. You lump them together into what  
 10 category?  
 11 A. The hydrodynamic dispersion coefficient.  
 12 Q. Did you calculate the hydrodynamic  
 13 dispersion coefficient at the IPSB property or the  
 14 Levert property?  
 15 A. I did not.  
 16 Q. Okay. How would you go about  
 17 calculating that?  
 18 A. Well, I think the important thing here  
 19 is that this is, I would say, a  
 20 diffusion-dominated environment. As we've been  
 21 talking, groundwater velocity is slow. So I think  
 22 diffusion into the clays is a very dominant  
 23 process acting on the chlorides at this site.  
 24 Q. So at this site, diffusion is the  
 25 dominant -- what did you say?

26

1 I don't have it memorized, you know.  
 2 Q. Okay. So if the groundwater is not  
 3 moving at all, you're still going to have  
 4 dispersion of chlorides, right?  
 5 A. Diffusion.  
 6 Q. Diffusion?  
 7 A. Yes.  
 8 Q. I get those very confused. So what is  
 9 dispersion, and what's diffusion?  
 10 A. Okay. Dispersion is a mixing  
 11 mechanism -- mechanical dispersion -- let's start  
 12 there -- is a mixing mechanism that occurs  
 13 whenever advection occurs. So if the groundwater  
 14 moves, there's going to be pore-scale velocity  
 15 variations. And that's called mechanic  
 16 dispersion. It leads to dilution.  
 17 Diffusion is in response to a concentration  
 18 gradient. Diffusion will occur whether there's a  
 19 velocity or not. The velocity can be zero, you'll  
 20 still have diffusion occurring. And then  
 21 mathematically, mechanical dispersion plus  
 22 diffusion, we call that hydrodynamic dispersion.  
 23 So diffusion is actually a subcomponent of  
 24 dispersion.  
 25 Q. Diffusion is a subcomponent of

28

1 A. Mechanism controlling the fate of  
 2 chlorides; mechanism.  
 3 There would be portions, you know, there  
 4 might be a silt lands here or there where  
 5 advection is more important. But overall, this is  
 6 a very slow-moving groundwater regime with a lot  
 7 of diffusion going on.  
 8 Q. Okay. That other word you were using,  
 9 did you say "advection?"  
 10 A. Yes. Okay, pardon me. I shouldn't have  
 11 introduced a new term without defining it. So  
 12 advection, think of that as the same as  
 13 groundwater velocity. In other words, the  
 14 groundwater moves. Whatever is dissolved in the  
 15 groundwater moves, also. That's advection, that  
 16 water rate at the velocity.  
 17 Q. Okay. So with respect to diffusion,  
 18 since it's the dominant mechanism, how much  
 19 movement of chlorides would you expect along this  
 20 property boundary, the western part boundary of  
 21 the Levert property between MW4 and MW5?  
 22 A. You're asking about October 13th, 2015?  
 23 Q. Yes.  
 24 A. I haven't calculated that. It will be  
 25 slow.

29

1 Q. Okay. It would be faster than the  
 2 groundwater velocity, though?  
 3 A. I haven't done that calculation.  
 4 Q. Okay. So do we know how far chlorides  
 5 at MW4 would travel to the east in sort of, you  
 6 know, feet per year, like you did with groundwater  
 7 velocity?  
 8 A. On this particular date, they're moving  
 9 from MW4, if you want to pinpoint that as the  
 10 starting point, these data indicate that they'd be  
 11 moving to the south by advection and in all  
 12 directions by diffusion.  
 13 Q. Okay. And the diffusion in all  
 14 directions, how fast is that?  
 15 A. I didn't calculate that.  
 16 Q. Is that something that can be  
 17 calculated?  
 18 A. You could estimate it. I'm not sure we  
 19 need to do that here. I don't need to do that to  
 20 support my opinions, put it that way.  
 21 Q. Okay. Well, what I'm getting at is, if  
 22 we found chlorides at MW4, let's say at about  
 23 12,000 milligrams per liter, we could expect that  
 24 those chlorides are going to be moving to the east  
 25 onto the Levert property at some rate based on

31

1 don't think we need it. I mean, one thing we know  
 2 for sure is that concentrations are going to  
 3 continue to decline in groundwater, because our  
 4 sources have been removed, right. It's no longer  
 5 operating and also pit closure going on. Excuse  
 6 me. So concentrations will continuously decline.  
 7 And given it's a diffusion-dominated environment,  
 8 yes, it will be on the order of decades.  
 9 Q. Okay. Well, what would you need to do  
 10 that calculation?  
 11 A. Well, again, I don't think we need it.  
 12 But if I had to do it, I would need a diffusion  
 13 coefficient, which you can calculate.  
 14 Q. Okay. You'd need a diffusion  
 15 coefficient to calculate, okay. What else would  
 16 you need?  
 17 A. You'd need your starting concentration,  
 18 which in your question was 12,000. But again, I  
 19 always come back to, you know, you don't need to  
 20 do that for this site.  
 21 Q. Okay. Starting concentration, and then  
 22 what else would you need?  
 23 A. That would be basically it.  
 24 Q. Okay. So what would we need to  
 25 determine the diffusion coefficient?

30

1 diffusion being the primary mechanism controlling  
 2 the fate of chlorides here, right?  
 3 MR. TROUTMAN: Object to form.  
 4 THE WITNESS: Given the figure that  
 5 we're looking at, there would be diffusive  
 6 movement -- well, not based on this figure,  
 7 but there will be diffusive movement of  
 8 chloride in all directions. And, of course,  
 9 as that chlorides move, you know, the  
 10 concentrations are reduced. Diffusion as a  
 11 dispersion is an attenuation mechanism.  
 12 EXAMINATION BY MR. HUDDLELL:  
 13 Q. So again, assuming that we had about  
 14 12,000 milligrams per liter of chlorides at MW4,  
 15 how long would it take for those chlorides to drop  
 16 down to 250 milligrams per liter?  
 17 A. Due to natural attenuation processes,  
 18 like dispersion and diffusion, it would be on the  
 19 order of decades.  
 20 Q. Okay. Is that a calculation you've made  
 21 in this case?  
 22 A. I did not do that.  
 23 Q. Are you capable of doing that  
 24 calculation?  
 25 A. I don't think we -- I could do it, but I

32

1 A. Well, you'd want literature, and you  
 2 would estimate the diffusion coefficient given the  
 3 molecular weight of chloride and a couple other  
 4 things that are easy to look up for chloride.  
 5 Q. Anything else you would need?  
 6 A. For the diffusion coefficient, you'd  
 7 need the tortuosity of the porous medium. But  
 8 again, that can be estimated.  
 9 Q. What was that word, the what of the --  
 10 A. Tortuosity.  
 11 Q. How do you spell that?  
 12 A. T-O-R-T-U-O-S-I-T-Y.  
 13 Q. Is that a site-specific parameter?  
 14 A. You can estimate it given knowledge of  
 15 the geology. So, you know, for clays and silts,  
 16 you can make an estimate as to what it is.  
 17 Q. Okay. Anything else we would need to  
 18 determine diffusion coefficient?  
 19 A. No.  
 20 Q. Do you have any opinions as to the  
 21 source of the chlorides that have been found in  
 22 limited admission area 1?  
 23 A. They would have come from the IPSB  
 24 property, that pit that's since has been closed  
 25 over there.

33

1 Q. What mechanism brought the chlorides  
 2 from the IPSB property to the Levert property and  
 3 limited admission area 1?  
 4 A. It would have been advection; in other  
 5 words, the velocity, which back when those pits  
 6 were operating, would have been much higher than  
 7 it is here in October 2015.  
 8 Q. Can you explain what you're referring to  
 9 about using the pits, how that affects the  
 10 movement of chlorides?  
 11 A. Sure. Yes. The pits have fluids going  
 12 into them, and that creates a hydraulic mound,  
 13 which increases the hydraulic gradient and pushes  
 14 the chlorides faster than they're moving today.  
 15 Q. Do you know when the large pit on the  
 16 IPSB property was no longer used?  
 17 MR. TROUTMAN: Object to form.  
 18 THE WITNESS: The pit on the IPSB  
 19 property that I think we're talking about, I  
 20 remember reading that. I think it's in the  
 21 HET report, may be in the ICON report, as  
 22 well. I don't want to speculate when it was  
 23 no longer operating. I remember reading the  
 24 numbers the other day, but I don't want to  
 25 speculate.

35

1 says "LT-1" there, Bill? And then there's a  
 2 pit just to the, I guess, northwest of that.  
 3 EXAMINATION BY MR. HUDDLELL:  
 4 Q. So anyway, there what he's outlined in  
 5 black, is that the pit you're referring to that  
 6 had the hydraulic head?  
 7 A. That's my understanding, yes.  
 8 Q. Okay. All right. So back when that pit  
 9 was in use, you had additional mechanisms that  
 10 would have forced the chlorides to move to the  
 11 Levert property; is that right?  
 12 A. You would have had that hydraulic  
 13 loading that I was talking about; in other words,  
 14 it would be a stronger hydraulic gradient to the  
 15 east than what we have today.  
 16 Q. Okay. And do you know how long then it  
 17 would have taken for the chlorides to move onto  
 18 the Levert property back when that pit was  
 19 operating?  
 20 A. I didn't do that calculation.  
 21 Q. What would you need to do that  
 22 calculation?  
 23 A. You'd need to know the fluid level in  
 24 the pit, and you'd have to know the density of the  
 25 chloride solution, the brine that's leaking out of

34

1 MR. HUDDLELL: Can we go to figure 8 of  
 2 Exhibit 3, Bill.  
 3 THE WITNESS: That's the 1987 aerial  
 4 photo; is that right?  
 5 MR. HUDDLELL: Yes.  
 6 THE VIDEOGRAPHER: Kevin, what PDF  
 7 number is that?  
 8 MR. HUDDLELL: Tab 4. It's PDF page 9.  
 9 EXAMINATION BY MR. HUDDLELL:  
 10 Q. All right. Do you see this, Dr. Kueper?  
 11 A. I see -- let me just flip back to the  
 12 Zoom meeting, make sure. Just a little better  
 13 focused on my screen.  
 14 Q. Sure.  
 15 A. Yes, same one up.  
 16 Q. Okay. So I think what you're referring  
 17 to as this pit feature on the left side of the '87  
 18 aerial photo; is that right?  
 19 A. Yes. I was just on my screen. Did you  
 20 point to it? I can't see a pointer.  
 21 Q. No, I didn't point to it.  
 22 A. Oh, okay.  
 23 Q. Let's see.  
 24 THE VIDEOGRAPHER: Is this it, Kevin?  
 25 MR. HUDDLELL: Sure. Do you see where it

36

1 the pit.  
 2 Q. Do you know the chloride content of the  
 3 produced water that was put into that pit?  
 4 A. I do not. I did not look that up. I'm  
 5 not even sure it's available. Probably is  
 6 somewhere, but I don't recall reading that, no.  
 7 Q. Do you know generally what the chloride  
 8 content is of produced water?  
 9 A. Well, it's in the many tens of thousands  
 10 of milligrams per liter.  
 11 Q. So if we're finding chlorides of  
 12 12,400 milligrams per liter at LT-1, are you  
 13 able -- does that help you figure out how long it  
 14 would have been before those chlorides got there?  
 15 MR. TROUTMAN: Object to form.  
 16 THE WITNESS: Just knowing the  
 17 concentration of chlorides at LT-1 does not  
 18 tell me how long it took for them to get  
 19 there. But that number is a lot lower than  
 20 typical produced water, chloride content.  
 21 EXAMINATION BY MR. HUDDLELL:  
 22 Q. Okay. Let's talk about monitored  
 23 natural attenuation.  
 24 THE WITNESS: Kevin, it's been an hour.  
 25 Could we take a short bio break now, since

37

1 you're switching topics now?  
 2 MR. HUDDLELL: Sure, absolutely. 10  
 3 minutes?  
 4 THE VIDEOGRAPHER: We're going off the  
 5 record, it's 9:58 a.m.  
 6 (RECESS 9:58-10:12 A.M.)  
 7 THE VIDEOGRAPHER: Back on the record,  
 8 it's 10:12 a.m.  
 9 EXAMINATION BY MR. HUDDLELL:  
 10 Q. All right. Dr. Kueper, can you tell us  
 11 what monitored natural attenuation is, or MNA?  
 12 A. Sure. Monitored natural attenuation,  
 13 we'll call it MNA as you suggest, is a remediation  
 14 strategy whereby natural processes attenuate; in  
 15 other words, lower the concentrations of  
 16 constituents over time.  
 17 Q. Okay. So what documents or what  
 18 literature are you relying on to support your  
 19 opinions with respect to MNA?  
 20 A. The two primary ones -- I'm just  
 21 flipping on my other screen here to my appendix,  
 22 and it's EPA 1999 document, I believe. Where is  
 23 that? We would have produced it. Just give me a  
 24 second here.  
 25 Yes. U.S. EPA April 1999, Use of Monitored

39

1 primary constituents is chlorides, correct?  
 2 A. Correct.  
 3 Q. And so with respect to chlorides, your  
 4 use of monitored natural attenuation would be  
 5 simply to put in monitoring wells and look at the  
 6 chlorides, right?  
 7 A. Well, for chloride, you would put in  
 8 monitoring wells, as proposed in the HET plan, and  
 9 monitor them and look at the data and move  
 10 forward.  
 11 Q. All right. How long would you monitor  
 12 the chlorides?  
 13 A. Well, HET has proposed one year with  
 14 quarterly sampling in that year. And HET makes  
 15 the argument in their report that there's no  
 16 adverse risk at this site. So you start with one  
 17 year, and then LDNR can decide maybe they want  
 18 another year. I don't know. Maybe they want a  
 19 few more years. Maybe they'll decrease the  
 20 frequency. You start with one year quarterly and  
 21 see where you're at with the data.  
 22 Q. Well, in your experience, monitored  
 23 natural attenuation requires at least three years  
 24 of monitoring, right?  
 25 A. I've written that for other cases, yes,

38

1 Natural Attenuation at Superfund, RCRA Corrective  
 2 Action, and Underground Storage Tank Sites, OSWER  
 3 Directive 9200.4-17P, as in Peter.  
 4 Then RECAP also discusses -- RECAP 2003  
 5 document discusses MNA, as well. And there are  
 6 other MNA documents out there, as accepted remedy  
 7 at certain sites. Been around for quite a while.  
 8 Q. Okay. Did you follow RECAP -- did you  
 9 look at RECAP before you wrote your opinions in  
 10 this case?  
 11 A. Yes.  
 12 MR. HUDDLELL: Okay. So, Bill, let's  
 13 pull up Tab 13, which is the RECAP document.  
 14 We'll mark that as Exhibit 4.  
 15 (EXHIBIT 4 IDENTIFIED)  
 16 EXAMINATION BY MR. HUDDLELL:  
 17 Q. All right. So this is the Louisiana  
 18 RECAP document. My understanding is it discusses  
 19 monitored natural attenuation in Section 2.16; is  
 20 that right?  
 21 A. That sounds familiar.  
 22 MR. HUDDLELL: Okay. And, Bill, that is  
 23 at PDF page 79.  
 24 EXAMINATION BY MR. HUDDLELL:  
 25 Q. Okay. And so for this case, one of our

40

1 other sites, other reports. I think what -- you  
 2 know, a lot of these sites are somewhat similar in  
 3 Louisiana in that you get this very low  
 4 permeability, you know, upper geology. And for  
 5 this particular site, given the low hydraulic  
 6 conductivity, the low groundwater velocity that we  
 7 talked about before the break -- and lack of  
 8 receptors, which is really key.  
 9 Now, I'm not a risk assessor, but I read the  
 10 HET report. And where you have a situation like  
 11 this with no receptors being impacted and not  
 12 expected to be in the future, you start with  
 13 quarterly per year and see where you're at.  
 14 That's for LDNR to decide.  
 15 Q. All right. So under RECAP, it says that  
 16 MNA should be evaluated and compared to other  
 17 remedial processes to determine which is the most  
 18 appropriate process for a site, right?  
 19 A. I see that on my version here, that  
 20 sentence, yes. It, meaning MNA, yes.  
 21 Q. Yes. As with any remedial process,  
 22 monitored natural attenuation should be selected  
 23 only where it can meet all other remedial goals  
 24 for this site and where it can obtain those goals  
 25 in an appropriate timeframe, correct?

41

1 A. I see that sentence, yes.  
 2 Q. All right. Do you agree with that?  
 3 MR. TROUTMAN: Object to form.  
 4 THE WITNESS: I think that MNA is  
 5 appropriate for this site. Remember, this is  
 6 RECAP. And where it can obtain those goals  
 7 in an appropriate timeframe, yes, I agree  
 8 with that, sure.  
 9 EXAMINATION BY MR. HUDDLELL:  
 10 Q. Okay. So this is Department of  
 11 Environmental Quality, in their RECAP document,  
 12 saying that it should be selected -- MNA should be  
 13 selected only where it can meet all of the  
 14 remedial goals for the site and where it can  
 15 obtain those goals in an appropriate timeframe,  
 16 right?  
 17 A. I see that, yes.  
 18 Q. Okay. Do you strongly agree with that?  
 19 MR. TROUTMAN: Object to form.  
 20 THE WITNESS: I agree with that  
 21 sentence, let's put it that way.  
 22 EXAMINATION BY MR. HUDDLELL:  
 23 Q. Okay. But you don't strongly agree with  
 24 it?  
 25 MR. TROUTMAN: Object to form.

43

1 other way -- not the other way -- yes, the other  
 2 way I think of it is, MNA, would it get you to  
 3 whatever your clean-up goal is, whether it's how  
 4 you want to calculate it or whatever the number  
 5 is. I don't see pump and treat being appreciably  
 6 faster, if at all, than MNA. And that was a key  
 7 thing in my thinking. I read the ICON plan. And  
 8 given that this is a diffusion-dominated  
 9 environment, I just don't see a lot of difference  
 10 between pump and treat and MNA in terms of the  
 11 timescale to get to whatever number you're trying  
 12 to get down to.  
 13 Q. Well, Dr. Kueper, what remedial goal did  
 14 you have in mind when you recommended MNA?  
 15 A. Well, like I just said, whatever number  
 16 DNR decides on, you know, pump and treat and MNA  
 17 are going to be about the same timescale to get  
 18 there. I looked at 124 milligrams per liter,  
 19 which is the ICON background number. I looked at  
 20 250 milligrams per liter. And then like we just  
 21 talked about, there's the HET point that with a  
 22 DAF applied, you don't exceed the goal at all  
 23 right now for chloride in groundwater.  
 24 Q. That was 110,000 milligrams per liter?  
 25 A. I think so. Let me get my calculator

42

1 THE WITNESS: I can't comment on your  
 2 definition of strongly versus mine, but I  
 3 don't object to that sentence. Does that  
 4 help?  
 5 EXAMINATION BY MR. HUDDLELL:  
 6 Q. Okay. You don't object to it?  
 7 A. Right.  
 8 Q. So what are the remedial goals for the  
 9 groundwater at the site?  
 10 A. Well, if you look at the HET report,  
 11 they calculated a dilution attenuation factor.  
 12 That value, I think it was 440. And multiply that  
 13 by the secondary -- EPA secondary drinking water  
 14 standard for chloride was 250 milligrams per  
 15 liter, which I think is also the -- leave it at  
 16 that. Then you multiply those two numbers  
 17 together, and you get 110,000. So HET is  
 18 proposing 110,000 milligrams per liter as the  
 19 acceptable concentration of chloride in  
 20 groundwater. And we -- not we. But the site does  
 21 not exceed 110,000 milligrams per liter.  
 22 Q. Okay.  
 23 A. Now --  
 24 Q. Go ahead. I'm sorry.  
 25 A. Yes. I mean, if you want to -- the

44

1 here.  
 2 Yes, that's right, 110,000.  
 3 Q. Okay. So you looked at 124 milligrams  
 4 per liter. You looked at 250 milligrams per  
 5 liter, and you looked at 110 milligrams per liter?  
 6 A. 110,000 milligrams per liter.  
 7 Q. Right. And what do you mean you looked  
 8 at them; what analysis did you do?  
 9 A. Well, like I said, I read, you know,  
 10 where those three numbers come from. And it's  
 11 clear to me that MNA is going to ultimately, it  
 12 will get you there. The site is not above the  
 13 110,000 currently; therefore, won't be in the  
 14 future, because the entire chloride distribution  
 15 is in declining condition, declining concentration  
 16 condition going forward in time. So whether you  
 17 want to get to 124 or 250, MNA is going to be on  
 18 the same order timescale as pump and treat,  
 19 because it's a diffusion-dominated environment.  
 20 You got back diffusion that's going to occur.  
 21 Q. What's back diffusion?  
 22 A. Okay. So these chlorides were  
 23 introduced to the groundwater system. And when  
 24 concentrations were, you know, high in the  
 25 silts -- and high is a term, you know, it's

45

1 qualitative -- but basically higher in the silts  
 2 than the surrounding clays, you get diffusion into  
 3 the clay. That's called forward diffusion. And  
 4 then with time -- and it's already occurring now,  
 5 in my opinion -- concentrations of chloride in the  
 6 silts are going down because of dispersion and  
 7 diffusion and because the pits are no longer  
 8 operating.  
 9 So what happens when the chloride  
 10 concentrations in the silts end up lower than in  
 11 the adjacent clays, now that the concentration  
 12 gradient is reversed, you now get diffusion out of  
 13 the clay back into the silt. And that will be the  
 14 ultimate time-limiting factor at this site. And  
 15 that back diffusion is going to dictate the  
 16 timescale for both MNA and for pump and treat.  
 17 That's really the point there, is both those  
 18 approaches are subject to this back diffusion  
 19 process. Therefore, pump and treat is not  
 20 appreciably faster, if at all, than MNA.  
 21 Q. You did not calculate time it would take  
 22 for MNA to reach 250 milligrams per liter, did  
 23 you?  
 24 A. No, I did not.  
 25 Q. You could have done that, right?

47

1 MR. TROUTMAN: No. I just said, object  
 2 to form. You can answer the question if you  
 3 can.  
 4 THE WITNESS: All right. Thank you.  
 5 I didn't feel the need -- repeat the  
 6 question, please.  
 7 EXAMINATION BY MR. HUDDLELL:  
 8 Q. You don't see an appreciable difference  
 9 in timeframe between MNA and pump and treat; yet,  
 10 you did not calculate the timeframe under MNA,  
 11 correct?  
 12 A. I did not calculate the timeframe  
 13 because I didn't need to. Diffusion affects both  
 14 pump and treat and MNA. I know, you know, based  
 15 on my experience and many years working with  
 16 diffusion, forward diffusion, back diffusion,  
 17 things like that, that it is a dominant process  
 18 going forward at this site. There's no need to do  
 19 a calculation to know that ultimately MNA will get  
 20 you wherever you want to be in terms of a  
 21 concentration. And that's going to be the same  
 22 with pump and treat. It's going to be a back  
 23 diffusion-limited process. I don't need to do  
 24 calculations to make that statement.  
 25 Q. The next sentence on page 69 says, "An

46

1 A. Possibly. I didn't feel the need to.  
 2 I'd have to think that through. But again, it's a  
 3 back diffusion-dominated environment.  
 4 Concentrations are declining now. So pump and  
 5 treat is going to be subject to this back  
 6 diffusion limitation, as will MNA. So therefore,  
 7 there's not, you know, a big difference in those  
 8 two technologies. So I selected MNA, in my  
 9 opinion.  
 10 Q. You didn't determine the time it would  
 11 take to reach 124 milligrams per liter with MNA,  
 12 correct?  
 13 A. I didn't feel a need to determine that  
 14 time. I did not do that. And again, I come back  
 15 to what I said in the previous answer: I don't  
 16 see a difference, an appreciable difference, in  
 17 the time for MNA and pump and treat to reach a  
 18 specified concentration in groundwater.  
 19 Q. You don't see an appreciable difference,  
 20 but you didn't actually calculate that difference,  
 21 correct?  
 22 MR. TROUTMAN: Object to form.  
 23 THE WITNESS: That's correct. I did not  
 24 calculate it -- sorry, John, did you say  
 25 something?

48

1 appropriate timeframe is one that is reasonable  
 2 compared to that offered by other remedial  
 3 methods. To ensure that the timeframe estimates  
 4 are comparable, the assumptions used in each  
 5 treatment proposal evaluated are to be  
 6 consistent."  
 7 Do you see that?  
 8 A. I do, yes.  
 9 Q. All right. And here, though, again, you  
 10 didn't do a timeframe estimate for MNA, correct?  
 11 A. The sentence doesn't tell you to do  
 12 that. It just says, the assumption should be  
 13 consistent. And I'm concluding that back  
 14 diffusion is going to affect pump and treat as it  
 15 will MNA. Therefore, there's no appreciable  
 16 difference in timescales.  
 17 Q. Unless otherwise approved by the  
 18 Department, the criteria presented in Sections  
 19 2.16.1 --  
 20 MR. TROUTMAN: Can you scroll down?  
 21 MR. HUDDLELL: I'm sorry, what?  
 22 MR. TROUTMAN: Can we scroll down?  
 23 MR. HUDDLELL: Oh. Bill, can you put  
 24 both pages?  
 25 THE WITNESS: I've got my version open

49

1 on my other screen.  
 2 EXAMINATION BY MR. HUDDLELL:  
 3 Q. Okay. So "Unless otherwise approved by  
 4 the Department, the criteria presented in Sections  
 5 2.16.1, .2 and .3 should be followed for monitored  
 6 natural attenuation plans submitted to the  
 7 Department," right?  
 8 A. I see that, yes.  
 9 Q. 2.16.1, Evidence to Support Monitored  
 10 Natural Attenuation says, "Monitored natural  
 11 attenuation of constituents of concern impacting  
 12 soil and/or groundwater may be allowed as a  
 13 remedial alternative when it has been demonstrated  
 14 to the Department that the constituent of concern  
 15 under site-specific conditions will naturally  
 16 attenuate to the appropriate RECAP standard  
 17 without causing adverse impacts."  
 18 Is that right?  
 19 A. That's what that says, yes.  
 20 Q. "Department requirements for a monitored  
 21 natural attenuation program shall include adequate  
 22 evidence to support a determination that:" And  
 23 then it lists five things, right?  
 24 A. Correct.  
 25 Q. Number 1 is that, "All sources of

51

1 down, down in concentration and will continue to  
 2 do so going forward in time. And that gets us to  
 3 point 2, which is reach declining conditions. It  
 4 has to have, because there's no more brine feeding  
 5 the system.  
 6 Q. Now, you don't know whether the area of  
 7 constituent concentrations is expanding or  
 8 declining at the Levert property, right?  
 9 MR. TROUTMAN: Object to form.  
 10 THE WITNESS: The chloride distribution  
 11 at the Levert property, I'd be shocked if it  
 12 was expanding at any appreciable rate. Are  
 13 there a couple molecules moving? Maybe. But  
 14 you got to remember, the sources have been  
 15 removed. So the whole plume is in a  
 16 declining condition; in other words,  
 17 concentrations are going down in time. And  
 18 that's why you monitor, as part of monitored  
 19 natural attenuation. You can actually  
 20 measure those concentrations as a function of  
 21 time to verify that.  
 22 EXAMINATION BY MR. HUDDLELL:  
 23 Q. Okay. So you haven't verified it yet,  
 24 right?  
 25 You suspect it based on the source having

50

1 constituents of concern have been controlled and  
 2 NAPL has been removed/controlled to the extent of  
 3 technical practicability," right?  
 4 A. I see that.  
 5 Q. Number 2, "The plume has reached  
 6 declining conditions and the area of constituent  
 7 concentrations above screening standard is not  
 8 expanding."  
 9 Is that right?  
 10 A. I see that, yes.  
 11 Q. So what have we done to show that the  
 12 plume has reached declining conditions?  
 13 A. Well, produced water has relatively high  
 14 concentrations of chloride. And the highest  
 15 number, I think you mentioned it, was 12,400 or  
 16 something on that order in a particular monitoring  
 17 well. Those numbers are going to keep going down.  
 18 Those concentrations is what I mean by numbers.  
 19 Because going back to point 1 above, the sources  
 20 have been controlled; in other words, the pits  
 21 have been closed or are going to be closed. And  
 22 even more important, they just haven't been used  
 23 for a long time.  
 24 So your sources are gone. And now you've got  
 25 this chloride plume, which is going down, down,

52

1 been removed, but you've not yet verified  
 2 constituent concentrations are declining, correct?  
 3 MR. TROUTMAN: Object to form.  
 4 THE WITNESS: I am using my experience  
 5 in 32 years of research in this area to give  
 6 an opinion that the concentrations are  
 7 declining in time, because, like I said, the  
 8 source has been removed. No more loading to  
 9 the ponds or the lagoons -- pardon me, the  
 10 pits. Three different sites in my head. So  
 11 yes, it's in my opinion we're in a declining  
 12 condition right now.  
 13 EXAMINATION BY MR. HUDDLELL:  
 14 Q. Okay. But we have no data to support  
 15 that yet; that's something that would have come  
 16 after you did some amount of monitoring, right?  
 17 MR. TROUTMAN: Object to form.  
 18 THE WITNESS: Well, it's my opinion that  
 19 the chloride concentrations are going down in  
 20 time. If LDNR would like some monitoring  
 21 data to support that, then that's fine, they  
 22 can ask for that.  
 23 EXAMINATION BY MR. HUDDLELL:  
 24 Q. Okay. Do you have a recommended  
 25 timeframe for the monitoring that would occur



53

1 during -- for your MNA?  
 2 A. Well, I agree with the four quarters for  
 3 one year, and then let's see where we are. At the  
 4 same time having said that, LDNR may not require  
 5 any monitoring. So I think we have to see what  
 6 LDNR are going to say. But starting quarterly for  
 7 one year, I think that's the right place to start.  
 8 And if LDNR recommends going further out in time,  
 9 then I'm fine with that.  
 10 Q. Is there -- well, if 110,000 milligrams  
 11 per liter is chosen as a remedial goal, you  
 12 wouldn't need the monitored natural attenuation at  
 13 all, would you?  
 14 A. That's correct.  
 15 Q. Okay. So Number 3, "Constituents are  
 16 susceptible to natural degradation processes,"  
 17 right?  
 18 A. I see that, yes.  
 19 Q. Okay. Would you agree that chlorides  
 20 are not susceptible to natural degradation  
 21 processes?  
 22 A. Chlorides are not susceptible to  
 23 degradation. I don't know -- if 3 means is the  
 24 constituents susceptible to concentrations going  
 25 down, yes, chloride concentrations will go down

55

1 but I did not do any risk evaluations.  
 2 Q. Okay. And then Number 5, "Conditions  
 3 are favorable for degradation and/or natural  
 4 attenuation of the constituent of concern." And  
 5 then it says, "This shall include documentation of  
 6 the constituents' degradability and/or attenuation  
 7 capacity and identification and discussion of  
 8 site-specific characteristics which support  
 9 natural attenuation."  
 10 Is that right?  
 11 A. I see that.  
 12 Q. One of the problems that you mentioned,  
 13 I guess, was that the chlorides can become bound  
 14 in the silts and then recontaminate the  
 15 groundwater; is that what you were saying?  
 16 MR. TROUTMAN: Object to form.  
 17 THE WITNESS: I didn't characterize it  
 18 as a problem.  
 19 EXAMINATION BY MR. HUDDLELL:  
 20 Q. Okay.  
 21 A. It's a process that's occurring out  
 22 there. And it also is a natural attenuation  
 23 process, because it does bind up the chloride and  
 24 prevents it from reaching potential receptors.  
 25 Q. Okay. But as far as conditions being

54

1 because of dispersion and diffusion. But there  
 2 are no biodegradation, for example, processes or  
 3 hydrolysis processes acting on chloride.  
 4 Q. So if we had organics, for example, we  
 5 would expect there to be some natural degradation  
 6 process, right?  
 7 A. Depending on the organic. Some require  
 8 aerobic environment; some require an anaerobic  
 9 environment. So you can't just say blanket that  
 10 all organics degrade. But all will under a  
 11 certain geochemical regime, yes.  
 12 Q. Okay. But we know that chlorides are  
 13 not susceptible to natural degradation processes,  
 14 correct?  
 15 A. Right. Degradation does not imply  
 16 concentration reduction. In other words, chloride  
 17 does not get destroyed; it just goes down in  
 18 concentration.  
 19 Q. Okay. Number 4, "Constituent  
 20 concentrations reaching human or ecological  
 21 receptors do not result in unacceptable risks."  
 22 That's not really something that you looked  
 23 at; it's something that other members of HET did,  
 24 right?  
 25 A. Yes. HET or, I think, Helen is at ERM,

56

1 favorable for attenuation, one unfavorable  
 2 condition is that this, I guess, reabsorption into  
 3 the silts; is that right?  
 4 MR. TROUTMAN: Object to form.  
 5 THE WITNESS: Well, we talked about  
 6 diffusions into the clays from the silts and  
 7 then back from the clays into the silts. And  
 8 that's a natural attenuation mechanism. It's  
 9 like a big sponge out there not allowing the  
 10 chloride to move.  
 11 MR. HUDDLELL: Let me share my screen for  
 12 a second, Bill.  
 13 So we'll mark as Exhibit 5, these are  
 14 your invoices.  
 15 (EXHIBIT 5 IDENTIFIED)  
 16 EXAMINATION BY MR. HUDDLELL:  
 17 Q. I'll just go through them quickly.  
 18 August 31st, 2022, this is your invoice for  
 19 August. Is it -- do you recall that you were  
 20 retained in August for this case?  
 21 A. I am not sure when I got my retention  
 22 letter, but if this is my first invoice, then  
 23 that's consistent with what I said at the  
 24 beginning of this deposition, which is on the  
 25 order of maybe six months when I was first

57

1 contacted.

2 Q. Okay. And we got one for October, one

3 for September. And I think that's it. All right.

4 MR. HUDDLELL: Can we take a two-minute

5 break? I think I might be just about done.

6 MR. TROUTMAN: Sounds good.

7 THE VIDEOGRAPHER: We're going off the

8 record. It's 10:42 a.m.

9 (RECESS 10:42-10:52 A.M.)

10 THE VIDEOGRAPHER: We're back on the

11 record. It is 10:52 a.m.

12 EXAMINATION BY MR. HUDDLELL:

13 Q. Dr. Kueper, with MNA, do you continue to

14 monitor until the remedial goal is met?

15 A. I think it depends on the particular

16 site. For some sites, you might do that. For

17 this site, I don't -- well, you'll have to defer

18 to DNR on that. The answer is, not necessarily.

19 Q. So according to HET, the remedial goals

20 for the groundwater have already been met. The

21 site conditions are below the remedial goals that

22 HET has identified for the groundwater; do you

23 agree with that?

24 A. That's how I understand their report,

25 yes, using RECAP, that's right.

59

1 deposition of Bernard Kueper. We're going

2 off the record. It is 10:55 a.m.

3 (DEPOSITION CONCLUDED AT 10:55 A.M.)

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

58

1 Q. And so if that is the case, you would

2 agree that MNA is not even necessary, correct?

3 A. Under that particular scenario, yes.

4 Q. Okay. And so unless DNR comes up with a

5 different remedial goal for the groundwater, your

6 recommendation is that no MNA is necessary,

7 correct?

8 MR. TROUTMAN: Object to form.

9 THE WITNESS: Can you read back the

10 question, please?

11 EXAMINATION BY MR. HUDDLELL:

12 Q. Sure. Unless the DNR were to come up

13 with a more stringent remedial goal than what HET

14 has already developed for the groundwater, your

15 recommendation would be that no MNA is required,

16 correct?

17 MR. TROUTMAN: Object to form.

18 THE WITNESS: I think that if the

19 110,000 is adopted, then there's no MNA

20 required for groundwater.

21 MR. HUDDLELL: All right. That's all the

22 questions I have.

23 MR. TROUTMAN: Thank you, Kevin.

24 No questions here.

25 THE VIDEOGRAPHER: This concludes the

60

1 CORRECTION SHEET

2 PAGE LINE DESCRIPTION

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

6 \_\_\_\_\_

7 \_\_\_\_\_

8 \_\_\_\_\_

9 \_\_\_\_\_

10 \_\_\_\_\_

11 \_\_\_\_\_

12 \_\_\_\_\_

13 \_\_\_\_\_

14 \_\_\_\_\_

15 \_\_\_\_\_

16 \_\_\_\_\_

17 \_\_\_\_\_

18 \_\_\_\_\_

19 \_\_\_\_\_

20 \_\_\_\_\_

21 \_\_\_\_\_

22 \_\_\_\_\_

23 WITNESS: DR. BERNARD KUEPER

24 TAKEN ON: NOVEMBER 22, 2022

25 BY: ANNA COATES, RPR, CCR

61

1 WITNESS' CERTIFICATE

2

3

4 I, DR. BERNARD KUEPER, read or have had the

5 foregoing testimony read to me and hereby certify

6 that it is a true and correct transcription of my

7 testimony, with the exception of any attached

8 corrections or changes.

9

10

11

12

13

14

15 \_\_\_\_\_ DATE SIGNED DR. BERNARD KUEPER

16

17

18

19 INITIAL ONE:

20

21 \_\_\_\_\_ Signed with corrections as noted.

22

23 \_\_\_\_\_ Signed with no corrections.

24

25 DATE TAKEN: NOVEMBER 22, 2022

62

1 REPORTER'S PAGE

2 I, ANNA COATES, Certified Court Reporter,

3 in and for the State of Louisiana, the

4 officer, as defined in Rule 28 of the Federal

5 Rules of Civil Procedure and/or Article 1434(B)

6 of the Louisiana Code of Civil Procedure, before

7 whom this sworn testimony was taken, do hereby

8 state on the record;

9 That due to the interaction in the

10 spontaneous discourse of this proceeding, dashes

11 (--) have been used to indicate pauses, changes

12 in thought, and/or talkovers; that same is the

13 proper method for the court reporter's

14 transcription of a proceeding, and that dashes

15 (--) do not indicate that words or phrases have

16 been left out of this transcript; also, that any

17 words and/or names which could not be verified

18 through reference material have been denoted with

19 the phrase "(spelled phonetically)."

20

21

22

23

24 \_\_\_\_\_ ANNA COATES, CCR, RPR

25 LOUISIANA CCR NO. 97018

63

1 REPORTER'S CERTIFICATE

2 This certification is valid only for a

3 transcript accompanied by my original signature

4 and original seal on this page.

5 I, ANNA C. COATES, CCR, RPR, do hereby

6 certify that DR. BERNARD KUEPER, to whom the oath

7 was administered, after having been duly sworn by

8 me upon authority of R.S. 37:2554, did testify as

9 herein above set forth in the foregoing 63 pages;

10 that this testimony was reported by me in the

11 stenotype reporting method, was prepared and

12 transcribed by me and is a true and correct

13 transcript to the best of my ability; that the

14 transcript has been prepared in compliance with

15 transcript format guidelines required by rules of

16 the board; that I have acted in compliance with

17 the prohibition on contractual relationships, as

18 defined by Louisiana Code of Civil Procedure

19 Article 1434 and in rules and advisory opinions of

20 the board; that I am not related to counsel or the

21 parties hereto, nor am I otherwise interested in

22 the outcome of this matter.

23

24 \_\_\_\_\_ DATE ANNA COATES, CCR, RPR

25 LOUISIANA CCR NO. 97018

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

<b>A</b>	<b>agree</b> 41:2,7 41:18,20 41:23 53:2 53:19 57:23 58:2	<b>appropriate</b> 40:22 19:13 42:11 49:6 49:10,11 49:21 61:4,15 63:6	1:19 5:2 5:15 6:1 59:1 60:23 61:4,15 63:6	27:17 <b>calculation</b> 14:5 29:3 30:20,24 31:10 35:20,22 47:19	<b>changes</b> 61:8 62:11 <b>characteri...</b> 55:8 <b>characterize</b> 55:17 <b>check</b> 8:16 23:8 <b>chemical</b> 24:1 <b>chloride</b> 25:3,16 30:8 32:3 32:4 35:25 36:2,7,20 39:7 42:14 42:19 43:23 44:14 45:5 45:9 50:14 50:25 51:10 52:19 53:25 54:3 54:16 55:23 56:10	<b>clays</b> 12:19 27:22 32:15 45:2 45:11 56:6 56:7 <b>clean-up</b> 43:3 <b>clear</b> 44:11 <b>closed</b> 32:24 50:21,21 <b>closely</b> 10:1 <b>closure</b> 31:5 <b>CLVS</b> 2:24 <b>co-owners</b> 6:17 <b>COATES</b> 2:25 4:22 60:25 62:2 62:24 63:5 63:24 <b>Code</b> 4:6 62:6 63:18 <b>coefficient</b> 27:11,13 31:13,15 31:25 32:2 32:6,18 <b>COKER</b> 4:22 <b>come</b> 13:13 31:19 32:23 44:10 46:14 52:15 58:12 <b>comes</b> 58:4 <b>coming</b> 20:11 <b>comment</b> 42:1 <b>company</b> 1:9 5:13 6:10 6:13,14,18 <b>comparable</b> 48:4 <b>compared</b> 18:16 40:16 48:2 <b>completely</b> 12:14,18 22:16 <b>compliance</b> 63:14,16
<b>a.m</b> 1:21 5:5 37:5,6,8 57:8,9,11 59:2,3	<b>AGREED</b> 4:3 <b>ahead</b> 42:24 <b>AL</b> 1:7 <b>allow</b> 11:17 <b>allowed</b> 49:12 <b>allowing</b> 56:9 <b>alternative</b> 49:13 <b>America</b> 1:9 5:12 <b>amount</b> 52:16 <b>anaerobic</b> 54:8 <b>analysis</b> 44:8 <b>and/or</b> 49:12 55:3,6 62:5,12,17 <b>ANNA</b> 2:25 4:22 60:25 62:2,24 63:5,24 <b>answer</b> 4:16 46:15 47:2 57:18 <b>anyway</b> 35:4 <b>appear</b> 6:25 9:4 <b>APPEAR...</b> 2:1 <b>appendix</b> 3:15,16 8:21,25 9:7 16:22 19:21 20:7 37:21 <b>applied</b> 43:22 <b>appreciable</b> 46:16,19 47:8 48:15 51:12 <b>appreciably</b> 43:5 45:20 <b>approaches</b> 45:18	<b>approved</b> 48:17 49:3 <b>approxima...</b> 13:2,10 21:19 <b>April</b> 37:25 <b>area</b> 25:17 32:22 33:3 50:6 51:6 52:5 <b>argument</b> 39:15 <b>Arnold</b> 2:5 5:9 <b>Article</b> 62:5 63:19 <b>asked</b> 8:14 8:19 15:8 <b>asking</b> 22:1 25:3,12 28:22 <b>assessor</b> 40:9 <b>assist</b> 9:21 <b>Associates</b> 6:10 9:14 <b>assume</b> 18:11 <b>assuming</b> 18:17,18 30:13 <b>assumption</b> 48:12 <b>assumptions</b> 48:4 <b>Atchafalaya</b> 16:6 <b>attached</b> 61:7 <b>attenuate</b> 37:14 49:16 <b>attenuation</b> 16:23 30:11,17 36:23 37:11,12 38:1,19 39:4,23	<b>August</b> 1:7 56:18,19 56:20 <b>authority</b> 63:8 <b>available</b> 36:5 <hr/> <b>B</b> <b>B</b> 3:12,16 6:10 9:13 19:22 20:7 <b>back</b> 23:8 31:19 33:5 34:11 35:8 35:18 37:7 44:20,21 45:13,15 45:18 46:3 46:5,14 47:16,22 48:13 50:19 56:7 57:10 58:9 <b>background</b> 43:19 <b>based</b> 10:25 11:14 16:5 21:4,7 23:2,10,19 25:14 29:25 30:6 47:14 51:25 <b>basically</b> 31:23 45:1 <b>Basin</b> 16:7 <b>Bates</b> 8:3,10 <b>beginning</b> 14:12 56:24 <b>behalf</b> 5:9,12 <b>believe</b> 8:16 10:18,25 37:22 <b>Bernard</b>	<b>best</b> 63:13 <b>better</b> 34:12 <b>big</b> 46:7 56:9 <b>Bill</b> 2:24 6:20 10:6 19:20 34:2 35:1 38:12 38:22 48:23 56:12 <b>bind</b> 55:23 <b>bio</b> 36:25 <b>biodegrad...</b> 54:2 <b>black</b> 35:5 <b>blanket</b> 54:9 <b>board</b> 10:3 63:16,20 <b>boring</b> 12:19 <b>bound</b> 55:13 <b>boundary</b> 22:11,13 28:20,20 <b>BP</b> 1:9 5:12 <b>break</b> 8:2 36:25 40:7 57:5 <b>brine</b> 35:25 51:4 <b>brought</b> 33:1 <hr/> <b>C</b> <b>C</b> 2:12 63:5 <b>calculate</b> 11:19 23:10 27:12 29:15 31:13,15 43:4 45:21 46:20,24 47:10,12 <b>calculated</b> 10:17 11:13,14 28:24 29:17 42:11 <b>calculating</b>	<b>Canada</b> 6:4 <b>capable</b> 30:23 <b>capacity</b> 55:7 <b>case</b> 8:14,15 9:5 10:3 16:18 17:19 20:12 30:21 38:10,25 56:20 58:1 <b>cases</b> 7:4,9 7:20 39:25 <b>category</b> 27:10 <b>causing</b> 49:17 <b>CCR</b> 2:25 4:22 60:25 62:24,25 63:5,24,25 <b>centimeters</b> 10:11,13 11:8,9 <b>certain</b> 15:16 17:18 38:7 54:11 <b>CERTIFL...</b> 3:5 61:1 63:1 <b>certification</b> 4:11 63:2 <b>Certified</b> 4:22 62:2 <b>certify</b> 61:5 63:6	

<b>component</b>	12:20	13:7,11	29:10 39:9	62:18	26:22,23	25:18	9:22 34:10
13:1 21:23	13:18,24	14:15,16	39:21	<b>density</b>	26:25 27:6	29:12,14	37:10
22:23,24	21:9 40:6	15:14 16:7	52:14,21	35:24	27:22,24	30:8	43:13
23:17 25:8	<b>confused</b>	17:21	<b>date</b> 7:9	<b>Department</b>	28:7,17	<b>Directive</b>	57:13
<b>components</b>	26:8	18:20 19:2	20:22 23:2	41:10	29:12,13	38:3	60:23 61:4
25:7,10	<b>consistent</b>	19:3 21:20	23:19	48:18 49:4	30:1,10,18	<b>discourse</b>	61:15 63:6
<b>concentrat...</b>	12:18 48:6	27:3 39:1	25:22 29:8	49:7,14,20	31:12,14	62:10	<b>draft</b> 9:24
26:17	48:13	39:2 40:25	61:15,25	<b>dependent</b>	31:25 32:2	<b>discusses</b>	<b>drinking</b>
31:17,21	56:23	46:12,21	63:24	16:25 17:2	32:6,18	38:4,5,18	42:13
36:17	<b>constituent</b>	46:23	<b>day</b> 16:2,3	17:5 19:5	44:20,21	<b>discussion</b>	<b>driving</b>
42:19	24:17	47:11	16:13 25:4	<b>depending</b>	45:2,3,7,12	55:7	25:21,23
44:15	49:14 50:6	48:10	33:24	24:16 54:7	45:15,18	<b>dispersion</b>	<b>drop</b> 16:6
45:11	51:7 52:2	49:24 52:2	<b>deal</b> 27:8	<b>depends</b>	46:6 47:13	26:4,9,10	30:15
46:18	54:19 55:4	53:14	<b>decades</b>	57:15	47:16,16	26:11,16	<b>due</b> 30:17
47:21 51:1	<b>constituents</b>	54:14 58:2	30:19 31:8	<b>deposition</b>	47:16	26:21,22	62:9
54:16,18	24:2,14	58:7,16	<b>decide</b> 39:17	1:18 4:4	48:14 54:1	26:24 27:1	<b>duly</b> 5:16
<b>concentrat...</b>	37:16 39:1	61:6 63:12	40:14	4:17 5:2,3	<b>diffusion-d...</b>	27:5,11,13	63:7
30:10 31:2	49:11 50:1	<b>CORREC...</b>	<b>decides</b>	7:21 56:24	27:20 31:7	30:11,18	
31:6 37:15	53:15,24	60:1	43:16	59:1,3	43:8 44:19	45:6 54:1	<b>E</b>
44:24 45:5	<b>constituents'</b>	<b>corrections</b>	<b>decline</b> 31:3	<b>derived</b> 11:4	46:3	<b>dissolved</b>	<b>E</b> 3:1,12,12
45:10 46:4	55:6	61:8,21,23	31:6	<b>DESCRIP...</b>	<b>diffusion-li...</b>	28:14	<b>E-R</b> 6:2
50:7,14,18	<b>consulting</b>	<b>Corrective</b>	<b>declining</b>	3:13 60:2	47:23	<b>distance</b>	<b>east</b> 15:5
51:7,17,20	6:10,16	38:1	44:15,15	<b>destroyed</b>	<b>diffusions</b>	21:2	22:19,21
52:2,6,19	<b>contacted</b>	<b>counsel</b> 4:4	46:4 50:6	54:17	56:6	<b>distribution</b>	23:7 24:25
53:24,25	57:1	5:6 63:20	50:12 51:3	<b>determina...</b>	<b>diffusive</b>	44:14	29:5,24
54:20	<b>contamina...</b>	<b>couple</b> 12:13	51:8,16	49:22	30:5,7	51:10	35:15
<b>conceptually</b>	24:11	32:3 51:13	52:2,7,11	<b>determine</b>	<b>dilution</b>	<b>DISTRICT</b>	<b>eastward</b>
15:11	<b>content</b> 36:2	<b>course</b> 30:8	<b>decrease</b>	31:25	26:16	1:1	22:15
<b>concern</b>	36:8,20	<b>court</b> 1:1	39:19	32:18	42:11	<b>divide</b> 21:2,9	<b>easy</b> 32:4
49:11,14	<b>continue</b>	2:12 4:22	<b>DEFEND...</b>	40:17	<b>direction</b>	<b>DIVISION</b>	<b>ecological</b>
50:1 55:4	31:3 51:1	5:11,17	2:9	46:10,13	12:25 14:1	1:5	54:20
<b>CONCLU...</b>	57:13	62:2,13	<b>defer</b> 57:17	<b>determined</b>	14:2,3,3,7	<b>DNR</b> 43:16	<b>edit</b> 9:25
59:3	<b>continuously</b>	<b>cover</b> 9:7,8	<b>defined</b> 62:4	17:20	14:9,15,18	57:18 58:4	<b>either</b> 7:7
<b>concludes</b>	31:6	<b>creates</b>	63:18	<b>determining</b>	14:19,21	58:12	11:16
58:25	<b>contour</b>	33:12	<b>defining</b>	19:13	14:22,24	<b>document</b>	<b>elevation</b>
<b>concluding</b>	12:24	<b>criteria</b>	28:11	<b>developed</b>	14:25	3:17 7:6	12:23
48:13	14:11	48:18 49:4	<b>Definitely</b>	58:14	15:13,16	7:10 37:22	14:11 15:9
<b>condition</b>	<b>contours</b>	<b>currently</b>	20:13	<b>dictate</b> 24:18	15:18,22	38:5,13,18	21:14
44:15,16	21:2,3	6:7 44:13	<b>definition</b>	45:15	15:25 16:9	41:11	25:21
51:16	<b>contractual</b>		42:2	<b>difference</b>	16:10,18	<b>document...</b>	<b>Email</b> 2:7,13
52:12 56:2	63:17	<b>D</b>	<b>degradabil...</b>	18:15 21:1	16:20 17:1	55:5	<b>emeritus</b> 6:8
<b>conditions</b>	<b>controlled</b>	<b>D</b> 2:11 3:1	55:6	43:9 46:7	17:6,7,12	<b>documents</b>	<b>empirical</b>
16:6 18:15	50:1,20	3:12	<b>degradation</b>	46:16,16	17:14,17	9:25 37:17	13:16
49:15 50:6	<b>controlling</b>	<b>DAF</b> 43:22	53:16,20	46:19,20	17:18,20	38:6	<b>employed</b>
50:12 51:3	28:1 30:1	<b>Darcy's</b>	53:23 54:5	47:8 48:16	18:22 19:2	<b>doing</b> 5:23	6:7 9:13
55:2,25	<b>conversation</b>	13:15,17	54:13,15	<b>different</b>	19:5,10,12	30:23	<b>employee</b>
57:21	15:10	21:11	55:3	14:25	21:22,23	<b>dominant</b>	9:16
<b>conductivi...</b>	<b>Cooley</b> 10:22	<b>DASCHB...</b>	<b>degrade</b>	15:23,25	21:23	27:22,25	<b>ensure</b> 48:3
10:10,16	<b>copy</b> 9:4	2:4	54:10	16:14,15	22:19,24	28:18	<b>entire</b> 44:14
11:4 12:7	<b>core</b> 10:20	<b>dashes</b> 62:10	<b>demonstra...</b>	22:25	24:3,15	47:17	<b>entirety</b>
12:16	10:20	62:14	49:13	52:10 58:5	<b>directionless</b>	<b>Dr</b> 1:19 5:15	21:11
<b>conductivity</b>	<b>correct</b>	<b>data</b> 8:20	<b>Denice</b> 2:11	<b>diffusion</b>	13:21	5:20 6:25	<b>entitled</b> 7:19
11:2,20	10:14,15	9:23 18:5	5:11	26:5,6,9,17	<b>directions</b>	7:20 8:4	<b>environment</b>
12:3,4,17	11:11 13:4	25:15	<b>denoted</b>	26:18,20	16:15,16	9:12,13,18	14:6 27:20

31:7 43:9	<b>exception</b>	<b>favorable</b>	14:18,24	<b>general</b>	44:11,16	27:21 28:6	<b>horizontal</b>
44:19 46:3	61:7	55:3 56:1	15:22,25	24:14 25:7	44:17,20	28:13,14	11:1,4
54:8,9	<b>Excuse</b> 31:5	<b>feature</b>	<b>fluid</b> 35:23	25:16	45:6,15	28:15 29:2	12:4 13:1
<b>Environm...</b>	<b>exhibit</b> 3:14	34:17	<b>fluids</b> 33:11	<b>generally</b>	46:5 47:18	29:6 31:3	<b>hour</b> 36:24
41:11	3:15,16,17	<b>Federal</b> 62:4	<b>focused</b>	36:7	47:21,22	40:6 42:9	<b>Huddell</b> 2:4
<b>EPA</b> 37:22	3:18 6:22	<b>feeding</b> 51:4	34:13	<b>geochemical</b>	48:14	42:20	2:4 3:3 5:8
37:25	6:23 8:25	<b>feel</b> 46:1,13	<b>follow</b> 38:8	54:11	50:17,17	43:23	5:8,19
42:13	9:2 20:4,4	47:5	<b>followed</b>	<b>geologic</b>	50:19,21	44:23	6:20,24
<b>ERM</b> 54:25	20:6,8	<b>feet</b> 13:10,14	49:5	11:20	50:25 51:2	46:18	7:18,23
<b>ESQUIRE</b>	34:2 38:14	13:22 14:4	<b>FOLLOWS</b>	12:17 14:6	51:17	49:12	8:1,5,11,12
2:4,5,10,11	38:15	14:8 15:3	5:18	<b>geology</b>	52:19 53:6	55:15	8:24 9:3
2:11,12	56:13,15	15:5 21:19	<b>force</b> 25:21	18:13	53:8,24	57:20,22	10:5,7
<b>estimate</b>	<b>expanding</b>	23:5,12	25:23	32:15 40:4	57:7 59:1	58:5,14,20	18:3 19:20
21:13,14	50:8 51:7	25:20,20	<b>forced</b> 35:10	<b>geometric</b>	<b>good</b> 5:20	<b>guess</b> 20:19	20:3,6,9
29:18 32:2	51:12	29:6	<b>foregoing</b>	11:1,3	57:6	22:6 35:2	22:3 24:8
32:14,16	<b>expect</b> 12:9	<b>figure</b> 19:23	61:5 63:9	<b>getting</b> 8:9	<b>gotten</b> 20:17	55:13 56:2	24:20 25:9
48:10	23:3,18	19:23	<b>form</b> 4:15	29:21	<b>grab</b> 8:1,5	<b>guidelines</b>	30:12 34:1
<b>estimated</b>	24:24	20:16 30:4	17:25	<b>give</b> 37:23	<b>gradient</b>	63:15	34:5,8,9,25
13:9 21:18	28:19	30:6 34:1	19:15	52:5	13:2,5,19	<hr/>	35:3 36:21
32:8	29:23 54:5	36:13	21:25 24:4	<b>given</b> 16:12	13:25	<b>H</b>	37:2,9
<b>estimates</b>	<b>expected</b>	<b>figures</b> 19:21	24:13 25:1	16:13 30:4	14:10	<b>H</b> 3:12	38:12,16
48:3	12:14	19:22 20:7	30:3 33:17	31:7 32:2	20:17,24	<b>happens</b>	38:22,24
<b>ET</b> 1:7	40:12	<b>filing</b> 4:11	36:15 41:3	32:14 40:5	20:25 21:3	45:9	41:9,22
<b>evaluated</b>	<b>experience</b>	<b>find</b> 8:6,7	41:19,25	43:8	21:5,7,12	<b>Harding</b>	42:5 47:7
40:16 48:5	39:22	<b>finding</b>	46:22 47:2	<b>go</b> 7:10 10:5	21:15 22:9	2:12	48:21,23
<b>evaluations</b>	47:15 52:4	24:22	51:9 52:3	15:8,18,21	23:10	<b>head</b> 23:9	49:2 51:22
55:1	<b>expert</b> 7:21	36:11	52:17	19:23	26:18	35:6 52:10	52:13,23
<b>evidence</b>	<b>explain</b> 33:8	<b>fine</b> 5:23	55:16 56:4	22:21 23:8	33:13	<b>held</b> 5:3	55:19
4:18 49:9	<b>explained</b>	52:21 53:9	58:8,17	27:16 34:1	35:14	<b>Helen</b> 54:25	56:11,16
49:22	18:18	<b>first</b> 5:16	<b>formalities</b>	42:24	45:12	<b>help</b> 36:13	57:4,12
<b>EXAMIN...</b>	<b>extent</b> 50:2	8:13,14	4:10	53:25	<b>grading</b>	42:4	58:11,21
3:2 5:19	<b>extremely</b>	12:6 56:22	<b>format</b> 63:15	56:17	25:25	<b>hereof</b> 4:17	<b>human</b>
6:24 8:12	19:18	56:25	<b>forth</b> 63:9	<b>goal</b> 43:3,13	<b>great</b> 8:11	<b>hereto</b> 4:4	54:20
9:3 10:7	<hr/>	<b>five</b> 8:17	<b>forward</b>	43:22	<b>groundwat...</b>	63:21	<b>hydraulic</b>
18:3 20:9	<b>F</b>	49:23	39:10	53:11	12:5,21,23	<b>HET</b> 9:7	10:10 11:2
22:3 24:8	<b>factor</b> 19:6	<b>flip</b> 34:11	44:16 45:3	57:14 58:5	12:25 13:9	10:14,19	11:4,20
24:20 25:9	19:12	<b>flipping</b>	47:16,18	58:13	13:17	12:24	12:3,7,16
30:12 34:9	24:11	37:21	51:2	<b>goals</b> 40:23	14:11 15:9	33:21 39:8	12:17 13:2
35:3 36:21	42:11	<b>flood</b> 16:6	<b>found</b> 24:2	40:24 41:6	15:21,24	39:13,14	13:18,19
37:9 38:16	45:14	<b>flow</b> 12:5,21	29:22	41:14,15	16:8,16,19	40:10	13:23,25
38:24 41:9	<b>fair</b> 23:1	12:25	32:21	42:8 57:19	16:21,25	42:10,17	20:17,24
41:22 42:5	<b>familiar</b>	15:12,13	<b>four</b> 7:22	57:21	17:5 18:8	43:21	20:25 21:3
47:7 49:2	38:21	16:8,15,16	53:2	<b>goes</b> 54:17	18:15 19:2	54:23,25	21:5,8,12
51:22	<b>FAMILY</b>	16:19,21	<b>frequency</b>	<b>going</b> 7:8	19:5,10,12	57:19,22	21:15 23:9
52:13,23	1:7	16:25 17:5	39:20	12:21	19:17	58:13	33:12,13
55:19	<b>far</b> 29:4	18:15,23	<b>full</b> 5:24	14:17	20:18,24	<b>HET's</b> 8:21	35:6,12,14
56:16	55:25	19:2,5,10	<b>function</b>	15:15	21:6,13,18	<b>high</b> 44:24	40:5
57:12	<b>fast</b> 12:21	19:12	51:20	18:11	21:24 22:8	44:25	<b>hydrodyna...</b>
58:11	29:14	21:24	<b>further</b> 23:6	19:18	22:25 23:4	50:13	26:22
<b>example</b>	<b>faster</b> 29:1	22:15,19	53:8	23:15 26:3	23:21,23	<b>higher</b> 12:14	27:11,12
16:5 24:21	33:14 43:6	23:18,21	<b>future</b> 40:12	26:14 28:7	23:25 24:2	33:6 45:1	<b>hydrogeol...</b>
54:2,4	45:20	23:24 25:7	44:14	29:24 31:2	24:10,12	<b>highest</b>	16:20
<b>exceed</b> 42:21	<b>fate</b> 28:1	25:8,11	<hr/>	31:5 33:11	24:15,16	50:14	<b>hydrogeol...</b>
43:22	30:2	<b>flowing</b>	<b>G</b>	37:4 43:17	26:2,13	<b>home</b> 6:6	27:3

<b>hydrolysis</b> 54:3	<b>interested</b> 63:21	<b>Kingston</b> 6:4 6:6,9	<b>lands</b> 28:4	<b>liter</b> 24:23 29:23	63:18,25	<b>mechanism</b> 26:11,12	<b>MNA</b> 16:25 17:2,7
<b>hypothetical</b> 15:7	<b>interrupting</b> 20:16	<b>know</b> 7:12 10:16,22	<b>large</b> 33:15	30:14,16	<b>low</b> 12:17	28:1,2,18	19:4,7,9,13
<hr/> <b>I</b> <hr/>	<b>introduce</b> 5:6	16:12,22	<b>law</b> 4:7 13:15,17	36:10,12	<b>lower</b> 12:10	30:1,11	37:11,13
<b>Iberville</b> 10:2	<b>introduced</b> 28:11	18:7 23:7	<b>layers</b> 11:6 12:12	42:15,18	36:19	33:1 56:8	37:19 38:5
<b>ICON</b> 11:23 12:24	44:23	23:11	<b>LDNR</b> 39:17 40:14	42:21	37:15	<b>mechanisms</b> 35:9	38:6 40:16
33:21 43:7	<b>invoice</b> 56:18,22	25:16 26:1	52:20 53:4	43:18,20	45:10	<b>medium</b> 32:7	40:20 41:4
43:19	<b>invoices</b> 3:18 8:6 56:14	28:3 29:4	53:6,8	43:24 44:4	<b>LT-1</b> 35:1	<b>meet</b> 40:23 41:13	41:12 43:2
<b>identical</b> 20:1	<b>involved</b> 8:13,14	29:6 30:9	<b>leads</b> 20:18 26:16	44:5,5,6	36:12,17	<b>lump</b> 27:7,9	43:16
<b>identificati...</b> 55:7	10:2	31:1,19	35:15	45:22	<b>lump</b> 27:7,9	<hr/> <b>M</b> <hr/>	44:11,17
<b>identified</b> 6:23 9:2	<b>IPSB</b> 10:13 11:6,24	32:15	35:16,23	46:11	<b>magnitude</b> 12:13,13	<b>meeting</b> 34:12	45:16,20
20:8 38:15	12:1 18:2	36:7 39:18	35:24 36:2	53:11	21:1	<b>members</b> 54:23	45:22 46:6
56:15	18:12,16	40:2,4	36:7 39:18	<b>literature</b> 32:1 37:18	<b>main</b> 16:22	<b>memorized</b> 26:1	46:8,11,17
57:22	18:20,23	43:16 44:9	40:2,4	<b>little</b> 34:12	<b>making</b> 7:8	<b>mentioned</b> 11:15	47:9,10,14
<b>impact</b> 23:21 23:21	19:1 22:17	44:24,25	43:16 44:9	<b>live</b> 6:4	<b>map</b> 21:5,8	14:12	47:19
<b>impacted</b> 40:11	22:18 23:1	46:7 47:14	44:24,25	<b>LLC</b> 1:7 2:4	21:12,14	50:15	48:10,15
<b>impacting</b> 49:11	27:13	47:14,19	46:7 47:14	<b>loading</b> 35:13 52:8	<b>maps</b> 12:24	55:12	53:1 57:13
<b>impacts</b> 25:16	32:23 33:2	51:6 53:23	47:14,19	<b>location</b> 16:9	14:11 15:9	<b>mark</b> 6:21	58:2,6,15
49:17	33:16,18	54:12	22:4 26:11	<b>locations</b> 16:14 23:7	<b>mark</b> 6:21	8:24 38:14	58:19
<b>imply</b> 54:15	<hr/> <b>J</b> <hr/>	<b>knowing</b> 36:16	29:22	<b>logs</b> 12:19	<b>MARY</b> 1:2	56:13	<b>molecular</b> 32:3
<b>important</b> 8:18 16:17	<b>J</b> 1:7	36:16	34:23	<b>long</b> 30:15	<b>material</b> 62:18	<b>met</b> 57:14,20	<b>molecules</b> 51:13
16:21	<b>Jamie</b> 2:11 5:10	38:12	36:22	35:16	<b>material</b> 62:18	<b>method</b> 62:13	<b>molecules</b> 51:13
27:18 28:5	<b>John</b> 2:5,10 5:8,10	41:21 53:3	38:12	36:13,18	<b>materials</b> 11:21	<b>methodolo...</b> 19:14	<b>monitor</b> 39:9 39:11
50:22	46:24	42:18	41:21 53:3	39:11	12:22	57:14	<b>monitored</b> 16:23
<b>include</b> 49:21 55:5	<b>JONES</b> 2:4 <b>JR</b> 1:7	43:13	42:18	50:23	<b>mathemati...</b> 26:21 27:7	8:22 48:3	36:22
<b>increases</b> 33:13	<b>jrtroutman...</b> 2:13	43:13	43:12	<b>longer</b> 31:4 33:16,23	26:21 27:7	<b>middle</b> 10:8	37:11,12
<b>indicate</b> 12:24	<b>JUDICIAL</b> 1:1	57:13 59:1	44:12	33:16,23	<b>matter</b> 63:22	<b>migrating</b> 24:3	37:25
29:10	<hr/> <b>K</b> <hr/>	60:23 61:4	44:3,4,5,7	45:7	<b>mean</b> 11:1,3	<b>milligrams</b> 24:22	38:19 39:4
62:11,15	<b>K-U-E-P</b> 6:1 <b>keep</b> 50:17	61:15 63:6	44:3,4,5,7	<b>look</b> 8:20 9:22,23	16:1 18:7	29:23	39:22
<b>indicated</b> 5:4 <b>initial</b> 9:22	<b>Kevin</b> 2:4 5:8 7:16	<b>Kueper's</b> 8:4	44:3,4,5,7	12:2 15:8	18:12 19:8	30:14,16	40:22 49:5
9:24 61:19	8:3 34:6	<hr/> <b>L</b> <hr/>	44:3,4,5,7	20:22 32:4	23:9 31:1	36:10,12	49:9,10,20
<b>input</b> 13:18 13:20	34:24	<b>L</b> 3:15 4:1 8:25	44:3,4,5,7	36:4 38:9	42:25 44:7	42:14,18	51:18
<b>inside</b> 11:18	36:24	<b>lab</b> 10:18,21 10:23,24	44:3,4,5,7	39:5,9	50:18	42:14,18	53:12
<b>intact</b> 10:23	58:23	<b>Label</b> 8:3	44:3,4,5,7	42:10	<b>meaning</b> 40:20	42:21	53:12
<b>intent</b> 16:3	<b>key</b> 40:8 43:6	<b>labeled</b> 8:10	44:3,4,5,7	<b>looked</b> 20:11 20:13,14	42:20	42:21	<b>monitoring</b> 11:5,17,22
<b>interaction</b> 62:9	<b>Khuddell...</b> 2:7	<b>Laboratory</b> 10:9	44:3,4,5,7	21:21 22:8	<b>means</b> 53:23	43:18,20	12:11 23:4
		<b>Lafayette</b> 2:13	44:3,4,5,7	22:25	<b>measure</b> 51:20	43:24 44:3	39:5,8,24
		<b>lack</b> 40:7	44:3,4,5,7	27:14	<b>measured</b> 10:9,18,24	44:4,5,6	50:16
		<b>Lafayette</b> 2:13	44:3,4,5,7	28:21	21:15	45:22	52:16,20
		<b>lists</b> 49:23	44:3,4,5,7	29:25 33:2	<b>measurement...</b> 13:6,22	46:11	52:25 53:5
			44:3,4,5,7	35:11,18	<b>mechanic</b> 26:15	53:10	<b>month</b> 16:13
			44:3,4,5,7	39:11	<b>mechanical</b> 26:11,21	<b>mind</b> 43:14	<b>months</b> 8:17
			44:3,4,5,7	50:23	27:5	<b>mine</b> 42:2	15:2,4
			44:3,4,5,7	50:23		<b>minus</b> 25:20 25:20	56:25
			44:3,4,5,7	50:23		<b>minutes</b> 37:3	<b>morning</b> 5:20
			44:3,4,5,7	50:23		<b>mirror</b> 22:16	<b>mound</b> 33:12
			44:3,4,5,7	50:23		<b>mixing</b> 26:10	
			44:3,4,5,7	50:23		26:12	

<b>move</b> 24:11 24:15 30:9 35:10,17 39:9 56:10	53:20 54:5 54:13 55:3 55:9,22 56:8	<b>O</b> <b>O</b> 4:1 <b>oath</b> 4:24 63:6 <b>object</b> 17:25 19:15 21:25 24:4 24:13 25:1 30:3 33:17 36:15 41:3 41:19,25 42:3,6 46:22 47:1 51:9 52:3 52:17 55:16 56:4 58:8,17	17:19 18:5 18:7,17,22 19:1,4 20:3,19,25 21:4,17 22:5,6,18 22:24 23:3 23:24 24:21 25:10 26:2 26:10 27:16 28:8 28:10,17 29:1,4,13 29:21 30:20 31:9 31:14,15 31:21,24 32:17 34:16,22 35:8,16 36:22 37:17 38:8 38:12,22 38:25 41:10,18 41:23 42:6 42:22 44:3 44:22 49:3 51:23 52:14,24 53:15,19 54:12,19 55:2,20,25 57:2 58:4	63:19 <b>opposite</b> 15:18,21 16:3 <b>order</b> 8:17 30:19 31:8 44:18 50:16 56:25 <b>orders</b> 12:13 <b>organic</b> 54:7 <b>organics</b> 54:4,10 <b>original</b> 63:3 63:4 <b>Orleans</b> 2:6 <b>OSWER</b> 38:2 <b>outcome</b> 63:22 <b>outlined</b> 35:4 <b>overall</b> 12:15 14:5 15:22 25:16 28:5	51:18 <b>particular</b> 10:8 15:22 16:9 17:23 25:4 29:8 40:5 50:16 57:15 58:3 <b>parties</b> 4:4 63:21 <b>Paul</b> 6:2 <b>pauses</b> 62:11 <b>PDF</b> 10:5 19:24 34:6 34:8 38:23 <b>people</b> 27:5 <b>performed</b> 11:23,24 <b>permeability</b> 40:4 <b>permitted</b> 4:6 <b>Peter</b> 38:3 <b>phonetically</b> 62:19 <b>photo</b> 34:4 34:18 <b>phrase</b> 62:19 <b>phrases</b> 62:15 <b>physically</b> 6:5 <b>physics</b> 17:9 <b>pinpoint</b> 29:9 <b>pit</b> 31:5 32:24 33:15,18 34:17 35:2 35:5,8,18 35:24 36:1 36:3 <b>pits</b> 33:5,9 33:11 45:7 50:20 52:10 <b>place</b> 53:7 <b>Plaintiffs</b> 2:3 5:9 <b>plan</b> 39:8 43:7 <b>plans</b> 49:6 <b>please</b> 5:6,24 9:7 47:6 58:10	<b>plume</b> 50:5 50:12,25 51:15 <b>plus</b> 26:21 <b>point</b> 16:13 29:10 34:20,21 43:21 45:17 50:19 51:3 <b>pointer</b> 34:20 <b>ponds</b> 52:9 <b>pore-scale</b> 26:14 <b>porosity</b> 21:10 <b>porous</b> 32:7 <b>portion</b> 15:23,24 <b>portions</b> 28:3 <b>Possibly</b> 46:1 <b>posted</b> 23:11 <b>potential</b> 24:11 55:24 <b>potentiom...</b> 21:4 24:23 <b>Poydras</b> 2:5 <b>practicabil...</b> 50:3 <b>practice</b> 6:16 <b>predomina...</b> 22:19 <b>predomina...</b> 11:6 12:12 25:14 <b>prepared</b> 9:20 12:24 63:11,14 <b>presented</b> 48:18 49:4 <b>preserved</b> 10:20 <b>pretty</b> 18:10 23:15,18 <b>prevents</b> 55:24 <b>previous</b> 12:8 14:12 14:14 46:15	<b>primary</b> 30:1 37:20 39:1 <b>probably</b> 22:20 23:15 36:5 <b>problem</b> 55:18 <b>problems</b> 55:12 <b>Procedure</b> 4:7 62:5,6 63:18 <b>proceeding</b> 62:10,14 <b>process</b> 27:23 40:18,21 45:19 47:17,23 54:6 55:21 55:23 <b>processes</b> 24:18 27:4 30:17 37:14 40:17 53:16,21 54:2,3,13 <b>produced</b> 36:3,8,20 37:23 50:13 <b>product</b> 21:10 <b>production</b> 1:9 5:13 8:4 <b>profession</b> 13:17 <b>professor</b> 6:8 <b>program</b> 49:21 <b>prohibition</b> 63:17 <b>proper</b> 62:13 <b>property</b> 8:23 10:13 11:7,24,25 12:1 22:9 22:10,12 22:17,18 22:22 23:1
<b>moved</b> 22:7 <b>movement</b> 24:24 28:19 30:6 30:7 33:10	<b>naturally</b> 49:15 <b>necessarily</b> 57:18 <b>necessary</b> 58:2,6 <b>need</b> 8:18 29:19,19 31:1,9,11 31:12,14 31:16,17 31:19,22 31:24 32:5 32:7,17 35:21,23 46:1,13 47:5,13,18 47:23 53:12 <b>negative</b> 10:11,12 11:8,9 <b>new</b> 2:6 28:11 <b>north</b> 22:22 <b>northern</b> 22:8,13 <b>northwest</b> 35:2 <b>noted</b> 61:21 <b>notice</b> 4:8 <b>November</b> 1:21 5:4 60:24 61:25 <b>number</b> 34:7 36:19 43:4 43:11,15 43:19 49:25 50:5 50:15 53:15 54:19 55:2 <b>numbers</b> 12:9,15 23:11 33:24 42:16 44:10 50:17,18	<b>obtained</b> 40:24 41:6,15 <b>occur</b> 26:18 44:20 52:25 <b>occurring</b> 26:20 45:4 55:21 <b>occurs</b> 26:12 26:13 <b>October</b> 20:20 25:4 25:12 28:22 33:7 57:2 <b>offered</b> 48:2 <b>office</b> 6:6 <b>officer</b> 62:4 <b>officiated</b> 4:24 <b>oh</b> 7:11,18 7:23 34:22 48:23 <b>okay</b> 6:7 7:3 7:15,18 8:5,11,24 9:11,17,21 10:5,25 11:2,12 12:2 13:8 13:21,25 14:7,17,20 15:2 16:17 17:2,14,16	17:19 18:5 18:7,17,22 19:1,4 20:3,19,25 21:4,17 22:5,6,18 22:24 23:3 23:24 24:21 25:10 26:2 26:10 27:16 28:8 28:10,17 29:1,4,13 29:21 30:20 31:9 31:14,15 31:21,24 32:17 34:16,22 35:8,16 36:22 37:17 38:8 38:12,22 38:25 41:10,18 41:23 42:6 42:22 44:3 44:22 49:3 51:23 52:14,24 53:15,19 54:12,19 55:2,20,25 57:2 58:4 <b>ones</b> 37:20 <b>Ontario</b> 6:4 <b>open</b> 19:25 48:25 <b>operating</b> 31:5 33:6 33:23 35:19 45:8 <b>opinion</b> 16:22 45:5 46:9 52:6 52:11,18 <b>opinions</b> 8:21 9:17 16:18 20:11 29:20 32:20 37:19 38:9	<b>Orleans</b> 2:6 <b>OSWER</b> 38:2 <b>outcome</b> 63:22 <b>outlined</b> 35:4 <b>overall</b> 12:15 14:5 15:22 25:16 28:5 <b>P</b> <b>P</b> 4:1 <b>page</b> 3:2,13 7:7,7,11 9:6,7,8 10:6 19:24 34:8 38:23 47:25 60:2 62:1 63:4 <b>pages</b> 48:24 63:9 <b>paragraph</b> 10:9 <b>paragraphs</b> 9:24 <b>parameter</b> 13:18,20 32:13 <b>pardon</b> 13:20 20:15 28:10 52:9 <b>Parish</b> 1:2 10:3 <b>part</b> 4:17 7:5 14:23,24 22:9,13 27:6 28:20	51:18 <b>particular</b> 10:8 15:22 16:9 17:23 25:4 29:8 40:5 50:16 57:15 58:3 <b>parties</b> 4:4 63:21 <b>Paul</b> 6:2 <b>pauses</b> 62:11 <b>PDF</b> 10:5 19:24 34:6 34:8 38:23 <b>people</b> 27:5 <b>performed</b> 11:23,24 <b>permeability</b> 40:4 <b>permitted</b> 4:6 <b>Peter</b> 38:3 <b>phonetically</b> 62:19 <b>photo</b> 34:4 34:18 <b>phrase</b> 62:19 <b>phrases</b> 62:15 <b>physically</b> 6:5 <b>physics</b> 17:9 <b>pinpoint</b> 29:9 <b>pit</b> 31:5 32:24 33:15,18 34:17 35:2 35:5,8,18 35:24 36:1 36:3 <b>pits</b> 33:5,9 33:11 45:7 50:20 52:10 <b>place</b> 53:7 <b>Plaintiffs</b> 2:3 5:9 <b>plan</b> 39:8 43:7 <b>plans</b> 49:6 <b>please</b> 5:6,24 9:7 47:6 58:10	<b>plume</b> 50:5 50:12,25 51:15 <b>plus</b> 26:21 <b>point</b> 16:13 29:10 34:20,21 43:21 45:17 50:19 51:3 <b>pointer</b> 34:20 <b>ponds</b> 52:9 <b>pore-scale</b> 26:14 <b>porosity</b> 21:10 <b>porous</b> 32:7 <b>portion</b> 15:23,24 <b>portions</b> 28:3 <b>Possibly</b> 46:1 <b>posted</b> 23:11 <b>potential</b> 24:11 55:24 <b>potentiom...</b> 21:4 24:23 <b>Poydras</b> 2:5 <b>practicabil...</b> 50:3 <b>practice</b> 6:16 <b>predomina...</b> 22:19 <b>predomina...</b> 11:6 12:12 25:14 <b>prepared</b> 9:20 12:24 63:11,14 <b>presented</b> 48:18 49:4 <b>preserved</b> 10:20 <b>pretty</b> 18:10 23:15,18 <b>prevents</b> 55:24 <b>previous</b> 12:8 14:12 14:14 46:15	<b>primary</b> 30:1 37:20 39:1 <b>probably</b> 22:20 23:15 36:5 <b>problem</b> 55:18 <b>problems</b> 55:12 <b>Procedure</b> 4:7 62:5,6 63:18 <b>proceeding</b> 62:10,14 <b>process</b> 27:23 40:18,21 45:19 47:17,23 54:6 55:21 55:23 <b>processes</b> 24:18 27:4 30:17 37:14 40:17 53:16,21 54:2,3,13 <b>produced</b> 36:3,8,20 37:23 50:13 <b>product</b> 21:10 <b>production</b> 1:9 5:13 8:4 <b>profession</b> 13:17 <b>professor</b> 6:8 <b>program</b> 49:21 <b>prohibition</b> 63:17 <b>proper</b> 62:13 <b>property</b> 8:23 10:13 11:7,24,25 12:1 22:9 22:10,12 22:17,18 22:22 23:1
<b>MW4</b> 23:4 23:14 24:23 25:3 28:21 29:5 29:9,22 30:14 <b>MW5</b> 23:4 23:14 28:21 <b>MYERS</b> 2:24	10:11,12 11:8,9 <b>new</b> 2:6 28:11 <b>north</b> 22:22 <b>northern</b> 22:8,13 <b>northwest</b> 35:2 <b>noted</b> 61:21 <b>notice</b> 4:8 <b>November</b> 1:21 5:4 60:24 61:25 <b>number</b> 34:7 36:19 43:4 43:11,15 43:19 49:25 50:5 50:15 53:15 54:19 55:2 <b>numbers</b> 12:9,15 23:11 33:24 42:16 44:10 50:17,18	<b>obtained</b> 40:24 41:6,15 <b>occur</b> 26:18 44:20 52:25 <b>occurring</b> 26:20 45:4 55:21 <b>occurs</b> 26:12 26:13 <b>October</b> 20:20 25:4 25:12 28:22 33:7 57:2 <b>offered</b> 48:2 <b>office</b> 6:6 <b>officer</b> 62:4 <b>officiated</b> 4:24 <b>oh</b> 7:11,18 7:23 34:22 48:23 <b>okay</b> 6:7 7:3 7:15,18 8:5,11,24 9:11,17,21 10:5,25 11:2,12 12:2 13:8 13:21,25 14:7,17,20 15:2 16:17 17:2,14,16	17:19 18:5 18:7,17,22 19:1,4 20:3,19,25 21:4,17 22:5,6,18 22:24 23:3 23:24 24:21 25:10 26:2 26:10 27:16 28:8 28:10,17 29:1,4,13 29:21 30:20 31:9 31:14,15 31:21,24 32:17 34:16,22 35:8,16 36:22 37:17 38:8 38:12,22 38:25 41:10,18 41:23 42:6 42:22 44:3 44:22 49:3 51:23 52:14,24 53:15,19 54:12,19 55:2,20,25 57:2 58:4 <b>ones</b> 37:20 <b>Ontario</b> 6:4 <b>open</b> 19:25 48:25 <b>operating</b> 31:5 33:6 33:23 35:19 45:8 <b>opinion</b> 16:22 45:5 46:9 52:6 52:11,18 <b>opinions</b> 8:21 9:17 16:18 20:11 29:20 32:20 37:19 38:9	<b>Orleans</b> 2:6 <b>OSWER</b> 38:2 <b>outcome</b> 63:22 <b>outlined</b> 35:4 <b>overall</b> 12:15 14:5 15:22 25:16 28:5 <b>P</b> <b>P</b> 4:1 <b>page</b> 3:2,13 7:7,7,11 9:6,7,8 10:6 19:24 34:8 38:23 47:25 60:2 62:1 63:4 <b>pages</b> 48:24 63:9 <b>paragraph</b> 10:9 <b>paragraphs</b> 9:24 <b>parameter</b> 13:18,20 32:13 <b>pardon</b> 13:20 20:15 28:10 52:9 <b>Parish</b> 1:2 10:3 <b>part</b> 4:17 7:5 14:23,24 22:9,13 27:6 28:20	51:18 <b>particular</b> 10:8 15:22 16:9 17:23 25:4 29:8 40:5 50:16 57:15 58:3 <b>parties</b> 4:4 63:21 <b>Paul</b> 6:2 <b>pauses</b> 62:11 <b>PDF</b> 10:5 19:24 34:6 34:8 38:23 <b>people</b> 27:5 <b>performed</b> 11:23,24 <b>permeability</b> 40:4 <b>permitted</b> 4:6 <b>Peter</b> 38:3 <b>phonetically</b> 62:19 <b>photo</b> 34:4 34:18 <b>phrase</b> 62:19 <b>phrases</b> 62:15 <b>physically</b> 6:5 <b>physics</b> 17:9 <b>pinpoint</b> 29:9 <b>pit</b> 31:5 32:24 33:15,18 34:17 35:2 35:5,8,18 35:24 36:1 36:3 <b>pits</b> 33:5,9 33:11 45:7 50:20 52:10 <b>place</b> 53:7 <b>Plaintiffs</b> 2:3 5:9 <b>plan</b> 39:8 43:7 <b>plans</b> 49:6 <b>please</b> 5:6,24 9:7 47:6 58:10	<b>plume</b> 50:5 50:12,25 51:15 <b>plus</b> 26:21 <b>point</b> 16:13 29:10 34:20,21 43:21 45:17 50:19 51:3 <b>pointer</b> 34:20 <b>ponds</b> 52:9 <b>pore-scale</b> 26:14 <b>porosity</b> 21:10 <b>porous</b> 32:7 <b>portion</b> 15:23,24 <b>portions</b> 28:3 <b>Possibly</b> 46:1 <b>posted</b> 23:11 <b>potential</b> 24:11 55:24 <b>potentiom...</b> 21:4 24:23 <b>Poydras</b> 2:5 <b>practicabil...</b> 50:3 <b>practice</b> 6:16 <b>predomina...</b> 22:19 <b>predomina...</b> 11:6 12:12 25:14 <b>prepared</b> 9:20 12:24 63:11,14 <b>presented</b> 48:18 49:4 <b>preserved</b> 10:20 <b>pretty</b> 18:10 23:15,18 <b>prevents</b> 55:24 <b>previous</b> 12:8 14:12 14:14 46:15	<b>primary</b> 30:1 37:20 39:1 <b>probably</b> 22:20 23:15 36:5 <b>problem</b> 55:18 <b>problems</b> 55:12 <b>Procedure</b> 4:7 62:5,6 63:18 <b>proceeding</b> 62:10,14 <b>process</b> 27:23 40:18,21 45:19 47:17,23 54:6 55:21 55:23 <b>processes</b> 24:18 27:4 30:17 37:14 40:17 53:16,21 54:2,3,13 <b>produced</b> 36:3,8,20 37:23 50:13 <b>product</b> 21:10 <b>production</b> 1:9 5:13 8:4 <b>profession</b> 13:17 <b>professor</b> 6:8 <b>program</b> 49:21 <b>prohibition</b> 63:17 <b>proper</b> 62:13 <b>property</b> 8:23 10:13 11:7,24,25 12:1 22:9 22:10,12 22:17,18 22:22 23:1
<b>MW5</b> 23:4 23:14 28:21 <b>MYERS</b> 2:24	10:11,12 11:8,9 <b>new</b> 2:6 28:11 <b>north</b> 22:22 <b>northern</b> 22:8,13 <b>northwest</b> 35:2 <b>noted</b> 61:21 <b>notice</b> 4:8 <b>November</b> 1:21 5:4 60:24 61:25 <b>number</b> 34:7 36:19 43:4 43:11,15 43:19 49:25 50:5 50:15 53:15 54:19 55:2 <b>numbers</b> 12:9,15 23:11 33:24 42:16 44:10 50:17,18	<b>obtained</b> 40:24 41:6,15 <b>occur</b> 26:18 44:20 52:25 <b>occurring</b> 26:20 45:4 55:21 <b>occurs</b> 26:12 26:13 <b>October</b> 20:20 25:4 25:12 28:22 33:7 57:2 <b>offered</b> 48:2 <b>office</b> 6:6 <b>officer</b> 62:4 <b>officiated</b> 4:24 <b>oh</b> 7:11,18 7:23 34:22 48:23 <b>okay</b> 6:7 7:3 7:15,18 8:5,11,24 9:11,17,21 10:5,25 11:2,12 12:2 13:8 13:21,25 14:7,17,20 15:2 16:17 17:2,14,16	17:19 18:5 18:7,17,22 19:1,4 20:3,19,25 21:4,17 22:5,6,18 22:24 23:3 23:24 24:21 25:10 26:2 26:10 27:16 28:8 28:10,17 29:1,4,13 29:21 30:20 31:9 31:14,15 31:21,24 32:17 34:16,22 35:8,16 36:22 37:17 38:8 38:12,22 38:25 41:10,18 41:23 42:6 42:22 44:3 44:22 49:3 51:23 52:14,24 53:15,19 54:12,19 55:2,20,25 57:2 58:4 <b>ones</b> 37:20 <b>Ontario</b> 6:4 <b>open</b> 19:25 48:25 <b>operating</b> 31:5 33:6 33:23 35:19 45:8 <b>opinion</b> 16:22 45:5 46:9 52:6 52:11,18 <b>opinions</b> 8:21 9:17 16:18 20:11 29:20 32:20 37:19 38:9	<b>Orleans</b> 2:6 <b>OSWER</b> 38:2 <b>outcome</b> 63:22 <b>outlined</b> 35:4 <b>overall</b> 12:15 14:5 15:22 25:16 28:5 <b>P</b> <b>P</b> 4:1 <b>page</b> 3:2,13 7:7,7,11 9:6,7,8 10:6 19:24 34:8 38:23 47:25 60:2 62:1 63:4 <b>pages</b> 48:24 63:9 <b>paragraph</b> 10:9 <b>paragraphs</b> 9:24 <b>parameter</b> 13:18,20 32:13 <b>pardon</b> 13:20 20:15 28:10 52:9 <b>Parish</b> 1:2 10:3 <b>part</b> 4:17 7:5 14:23,24 22:9,13 27:6 28:20	51:18 <b>particular</b> 10:8 15:22 16:9 17:23 25:4 29:8 40:5 50:16 57:15 58:3 <b>parties</b> 4:4 63:21 <b>Paul</b> 6:2 <b>pauses</b> 62:11 <b>PDF</b> 10:5 19:24 34:6 34:8 38:23 <b>people</b> 27:5 <b>performed</b> 11:23,24 <b>permeability</b> 40:4 <b>permitted</b> 4:6 <b>Peter</b> 38:3 <b>phonetically</b> 62:19 <b>photo</b> 34:4 34:18 <b>phrase</b> 62:19 <b>phrases</b> 62:15 <b>physically</b> 6:5 <b>physics</b> 17:9 <b>pinpoint</b> 29:9 <b>pit</b> 31:5 32:24 33:15,18 34:17 35:2 35:5,8,18 35:24 36:1 36:3 <b>pits</b> 33:5,9 33:11 45:7 50:20 52:10 <b>place</b> 53:7 <b>Plaintiffs</b> 2:3 5:9 <b>plan</b> 39:8 43:7 <b>plans</b> 49:6 <b>please</b> 5:6,24 9:7 47:6 58:10	<b>plume</b> 50:5 50:12,25 51:15 <b>plus</b> 26:21 <b>point</b> 16:13 29:10 34:20,21 43:21 45:17 50:19 51:3 <b>pointer</b> 34:20 <b>ponds</b> 52:9 <b>pore-scale</b> 26:14 <b>porosity</b> 21:10 <b>porous</b> 32:7 <b>portion</b> 15:23,24 <b>portions</b> 28:3 <b>Possibly</b> 46:1 <b>posted</b> 23:11 <b>potential</b> 24:11 55:24 <b>potentiom...</b> 21:4 24:23 <b>Poydras</b> 2:5 <b>practicabil...</b> 50:3 <b>practice</b> 6:16 <b>predomina...</b> 22:19 <b>predomina...</b> 11:6 12:12 25:14 <b>prepared</b> 9:20 12:24 63:11,14 <b>presented</b> 48:18 49:4 <b>preserved</b> 10:20 <b>pretty</b> 18:10 23:15,18 <b>prevents</b> 55:24 <b>previous</b> 12:8 14:12 14:14 46:15	<b>primary</b> 30:1 37:20 39:1 <b>probably</b> 22:20 23:15 36:5 <b>problem</b> 55:18 <b>problems</b> 55:12 <b>Procedure</b> 4:7 62:5,6 63:18 <b>proceeding</b> 62:10,14 <b>process</b> 27:23 40:18,21 45:19 47:17,23 54:6 55:21 55:23 <b>processes</b> 24:18 27:4 30:17 37:14 40:17 53:16,21 54:2,3,13 <b>produced</b> 36:3,8,20 37:23 50:13 <b>product</b> 21:10 <b>production</b> 1:9 5:13 8:4 <b>profession</b> 13:17 <b>professor</b> 6:8 <b>program</b> 49:21 <b>prohibition</b> 63:17 <b>proper</b> 62:13 <b>property</b> 8:23 10:13 11:7,24,25 12:1 22:9 22:10,12 22:17,18 22:22 23:1
<b>N</b> N 3:1,12 4:1 <b>name</b> 5:24 <b>names</b> 62:17 <b>NAPL</b> 50:2 <b>natural</b> 16:23 							

23:1 27:13	47:2,6	55:24	57:21 58:5	52:5	48:9 49:7	sealing 4:11	shallow
27:14	58:10	<b>RECESS</b>	58:13	<b>reserved</b>	49:18,23	<b>season</b> 16:14	12:25 13:8
28:20,21	<b>questions</b>	37:6 57:9	<b>remediation</b>	4:16	50:3,9	<b>seasonally</b>	21:17
29:25	58:22,24	<b>recommen...</b>	8:22 37:13	<b>reside</b> 6:3	51:8,24	16:5	<b>share</b> 56:11
32:24 33:2	<b>quickly</b>	58:6,15	<b>remedy</b> 38:6	<b>respect</b> 6:12	52:12,16	<b>second</b> 10:9	<b>SHEET</b> 60:1
33:2,16,19	24:19	<b>recommen...</b>	<b>remember</b>	19:6 20:23	53:7,17	10:12,13	<b>shocked</b>
35:11,18	56:17	43:14	7:5,8,13	28:17	54:6,15,24	11:8,9	18:14
51:8,11	<b>quite</b> 38:7	52:24	17:9 20:3	37:19 39:3	55:10 56:3	37:24	51:11
<b>proposal</b>	<hr/>	<b>recommends</b>	33:20,23	<b>response</b>	57:3,25	56:12	<b>short</b> 36:25
48:5	<b>R</b>	53:8	41:5 51:14	26:17	58:21	<b>secondary</b>	<b>shortly</b> 8:9
<b>proposed</b>	<b>R.S</b> 63:8	<b>recontami...</b>	<b>remove</b>	<b>responsive...</b>	<b>risk</b> 39:16	42:13,13	<b>show</b> 20:23
39:8,13	<b>ranged</b>	55:14	11:16	4:15	40:9 55:1	<b>Section</b>	50:11
<b>proposing</b>	10:10 11:7	<b>record</b> 5:25	<b>removed</b>	<b>restate</b> 19:11	<b>risks</b> 54:21	38:19	<b>showing</b>
42:18	<b>rate</b> 11:19	37:5,7	31:4 51:15	23:22	<b>role</b> 6:12	<b>Sections</b>	20:2
<b>propriety</b>	15:4,16,17	57:8,11	52:1,8	<b>result</b> 54:21	<b>RPR</b> 2:25	48:18 49:4	<b>side</b> 34:17
19:7,8	15:18	59:2 62:8	<b>removed/c...</b>	<b>résumé</b> 3:14	4:22 60:25	<b>see</b> 7:11,15	<b>signature</b>
<b>provide</b> 8:20	28:16	<b>recover</b>	50:2	6:21 7:1,3	62:24 63:5	9:7 22:16	63:3
<b>provided</b> 7:9	29:25	11:18	<b>repeat</b> 47:5	7:6	63:24	22:22	<b>signatures</b>
<b>pull</b> 6:20	51:12	<b>recovery</b>	<b>report</b> 8:21	<b>retained</b>	<b>Rule</b> 62:4	25:17,21	9:10
19:20	<b>RCRA</b> 38:1	11:19	9:5,18	56:20	<b>rules</b> 62:5	34:10,11	<b>signed</b> 9:11
38:13	<b>reabsorpti...</b>	<b>Redd-Robi...</b>	10:6,21	<b>retention</b>	63:15,19	34:20,23	61:15,21
<b>pump</b> 43:5	56:2	2:11 5:12	21:17	56:21	<hr/>	34:25	61:23
43:10,16	<b>reach</b> 45:22	<b>reduced</b>	33:21,21	<b>reversed</b>	<b>S</b>	39:21	<b>signing</b> 4:10
44:18	46:11,17	30:10	39:15	45:12	<b>S</b> 2:10 4:1	40:13,19	<b>silt</b> 12:16
45:16,19	51:3	<b>reduction</b>	40:10	<b>review</b> 9:25	<b>samples</b>	41:1,17	28:4 45:13
46:4,17	<b>reached</b> 50:5	54:16	42:10	<b>Rhymes</b> 2:11	10:24 12:9	43:5,9	<b>silts</b> 12:19
47:9,14,22	50:12	<b>reference</b>	57:24	5:11	<b>sampling</b>	46:16,19	32:15
48:14	<b>reaching</b>	10:14	<b>reported</b>	<b>right</b> 7:25	39:14	47:8 48:7	44:25 45:1
<b>purposes</b> 4:6	54:20	62:18	2:25 63:10	8:10 11:10	<b>save</b> 4:14	49:8 50:4	45:6,10
<b>pursuant</b> 4:7	55:24	<b>referring</b>	<b>Reporter</b>	13:3,6	<b>saying</b> 25:2	50:10 53:3	55:14 56:3
<b>pushes</b> 33:13	<b>read</b> 40:9	18:1 33:8	4:23 5:17	14:19,25	41:12	53:5,18	56:6,7
<b>put</b> 29:20	43:7 44:9	34:16 35:5	62:2	15:7,13,14	55:15	55:11	<b>silty</b> 11:6
36:3 39:5	58:9 61:4	<b>regarding</b>	<b>reporter's</b>	15:15,19	<b>says</b> 21:17	<b>selected</b>	12:12
39:7 41:21	61:5	8:21	3:5 62:1	17:4,8,14	35:1 40:15	40:22	<b>similar</b>
48:23	<b>reading</b> 4:10	<b>regime</b> 24:24	62:13 63:1	17:15,24	47:25	41:12,13	18:14,21
<hr/>	33:20,23	28:6 54:11	<b>reporting</b>	18:13	48:12	46:8	40:2
<b>Q</b>	36:6	<b>related</b>	63:11	20:14,20	49:10,19	<b>send</b> 10:21	<b>simply</b> 39:5
<b>qualitative</b>	<b>really</b> 19:18	63:20	<b>reports</b> 40:1	20:21	55:5	<b>sent</b> 7:13	<b>site</b> 8:22
45:1	40:8 45:17	<b>relationship</b>	<b>REPRESE...</b>	21:19	<b>scenario</b>	<b>sentence</b>	13:9 14:23
<b>Quality</b>	54:22	13:16	2:3,9	22:10,11	58:3	11:3,15	14:25
41:11	<b>reasonable</b>	<b>relationshi...</b>	<b>require</b>	23:14	<b>School</b> 10:3	12:8 14:13	15:23,24
<b>quantify</b>	18:10 48:1	63:17	17:12,17	23:16,20	<b>screen</b> 5:5	14:15 16:4	16:14,24
27:3	<b>recall</b> 36:6	<b>relatively</b>	53:4 54:7	26:4 27:2	11:22 20:1	40:20 41:1	17:23 18:2
<b>quantitati...</b>	56:19	50:13	54:8	30:2 31:4	34:13,19	41:21 42:3	18:2,4,6,9
27:8	<b>RECAP</b> 3:17	<b>relying</b>	<b>required</b>	34:4,10,18	37:21 49:1	47:25	18:19,20
<b>quarterly</b>	38:4,4,8,9	37:18	58:15,20	35:8,11	56:11	48:11	18:23 19:2
39:14,20	38:13,18	<b>remedial</b>	63:15	37:10	<b>screened</b>	<b>separate</b>	19:16
40:13 53:6	40:15 41:6	40:17,21	<b>requireme...</b>	38:17,20	11:5,21	7:12,16	21:18,24
<b>quarters</b>	41:11	40:23	49:20	39:6,11,24	12:11	27:4	22:2,4,13
53:2	49:16	41:14 42:8	<b>requires</b>	40:15,18	<b>screening</b>	<b>September</b>	27:23,24
<b>Queen's</b> 6:8	57:25	43:13 48:2	17:14	41:2,16	50:7	57:3	31:20
<b>question</b>	<b>receptors</b>	49:13	21:22	42:7 43:23	<b>scroll</b> 9:6	<b>set</b> 63:9	39:16 40:5
4:15 15:8	40:8,11	53:11	39:23	44:2,7	48:20,22	<b>sets</b> 12:15	40:18,24
24:7 31:18	54:21	57:14,19	<b>research</b>	45:25 47:4	<b>seal</b> 63:4	<b>setting</b> 12:18	41:5,14

42:9,20	51:14	58:13	51:5	test 11:16,23	37:16	48:5	understand
44:12	south 22:7	stronger		12:10,11	44:16 45:4	trial 7:21	57:24
45:14	22:11,14	35:14	<u>T</u>	13:24	45:21	Troutman	understan...
47:18	25:5,14,22	strongly	T 3:12 4:1,1	testified 7:4	46:10,14	2:10 5:10	35:7 38:18
57:16,17	25:24	41:18,23	T-O-R-T-...	7:20	46:17	5:10 7:14	unfavorable
57:21	29:11	42:2	32:12	testify 5:17	50:23 51:2	7:16,19,25	56:1
site-specific	southeast	subcompo...	Tab 3:14,15	63:8	51:17,21	8:3,8	unitless 13:5
15:10	22:23	26:23,25	3:16,17	testimony	52:7,20	17:25	14:1
32:13	southerly	subject	6:21 9:1	61:5,7	53:4,8	19:15	University
49:15 55:8	25:8	45:18 46:5	19:20,21	62:7 63:10	time-limiti...	21:25 24:4	6:9
sites 18:12	spatially	submission	34:8 38:13	tests 11:5,15	45:14	24:13 25:1	upper 40:4
23:13 38:2	14:23 15:1	7:13,17	take 8:20	Thank 47:4	timeframe	30:3 33:17	use 13:23
38:7 40:1	speak 19:19	submitted	21:1 22:2	58:23	40:25 41:7	36:15 41:3	16:25 17:2
40:2 52:10	specifically	49:6	30:15	they'd 29:10	41:15 47:9	41:19,25	19:4 35:9
57:16	4:11 25:18	suggest	36:25	thing 27:6	47:10,12	46:22 47:1	37:25 39:4
situation	specified	37:13	45:21	27:18 31:1	48:1,3,10	48:20,22	usually
40:10	46:18	suggested	46:11 57:4	43:7	52:25	51:9 52:3	16:21
six 8:17	speculate	15:17	taken 1:20	things 10:1	times 10:11	52:17	utilizes
56:25	33:22,25	suitability	4:5 35:17	20:10 32:4	10:12 11:7	55:16 56:4	13:17,19
slight 25:23	spell 32:11	16:23	60:24	47:17	11:8	57:6 58:8	
slow 27:21	spelled 62:19	Suite 2:6	61:25 62:7	49:23	timescale	58:17,23	<u>V</u>
28:25	sponge 56:9	super 8:18	takes 9:22	think 7:14	43:11,17	true 61:6	valid 63:2
slow-moving	spontaneous	Superfund	talk 9:18,23	8:25 9:20	44:18	63:12	value 13:13
28:6	62:10	38:1	25:15	18:10 27:5	45:16	try 8:1,3	14:5 23:13
slower 23:6	ST 1:2	support	36:22	27:18,21	timescales	23:24	42:12
slowly 19:18	standard	29:20	talked 12:7	28:12	48:16	trying 7:5,23	values 11:12
slug 11:5,14	42:14	37:18 49:9	40:7 43:21	30:25 31:1	today 5:21	8:6 17:9	12:10,11
11:15,23	49:16 50:7	49:22	56:5	31:11	6:5 8:15	43:11	13:24
12:10,10	standing	52:14,21	talking	33:19,20	33:14	TUESDAY	21:16 23:9
13:24	23:16	55:8	14:22	34:16 40:1	35:15	1:21	VanTassell
small 23:17	start 15:5	sure 7:8 9:10	15:12	41:4 42:12	topics 37:1	two 12:13,15	2:12 5:11
snapshot	18:4 22:4	15:20	18:24	42:15 43:2	tortuosity	16:14	variable
20:20	24:5 26:11	29:18 31:2	27:21	43:25 46:2	32:7,10	23:11	13:1 14:15
soil 10:19	39:16,20	33:11	33:19	50:15 53:5	touched	37:20	15:12 16:1
49:12	40:12 53:7	34:12,14	35:13	53:7 54:25	14:21	42:16 46:8	17:20,24
solution	starting	34:25 36:5	talkovers	57:3,5,15	transcribed	two-minute	19:1
35:25	29:10	37:2,12	62:12	58:18	63:12	57:4	variations
somewhat	31:17,21	41:8 56:21	Tank 38:2	thinking	transcript	types 10:1	26:15
40:2	53:6	58:12	technical	20:15 43:7	62:16 63:3	typical 14:5	varies 18:24
sorry 19:23	state 1:3	surrounding	50:3	thought	63:13,14	23:13	vary 14:21
21:13	4:23 5:24	45:2	technologies	14:20,22	63:15	36:20	15:1 16:9
42:24	62:3,8	susceptible	46:8	62:12	transcripti...		16:10
46:24	statement	53:16,20	tell 12:4,16	thousands	61:6 62:14	<u>U</u>	vector 17:11
48:21	47:24	53:22,24	36:18	36:9	travel 29:5	U 4:1	17:13
sort 24:23	stereotype	54:13	37:10	three 39:23	traveling	U.S 37:25	vectorless
29:5	63:11	suspect	48:11	44:10	15:3,5	ultimate	17:11
sought 4:17	STIPULA...	51:25	tells 12:20	52:10	treat 43:5,10	45:14	velocities
sounds 38:21	4:3	SWANSON	tens 36:9	time 4:16 5:4	43:16	ultimately	18:11
57:6	Storage 38:2	2:4	term 17:10	11:18	44:18	44:11	velocity 13:9
source 32:21	strategy	switching	17:11	14:22 15:1	45:16,19	47:19	17:10,10
51:25 52:8	16:24	37:1	28:11	16:10,11	46:5,17	unaccepta...	18:8,19,20
sources 31:4	37:14	sworn 5:16	44:25	16:12,13	47:9,14,22	54:21	20:18,24
49:25	Street 2:5,12	62:7 63:7	terms 43:10	20:20	48:14	Undergro...	21:6,11,18
50:19,24	stringent	system 44:23	47:20	23:24	treatment	38:2	21:22

22:25	18:5 23:15	52:18	<u>Z</u>	18 19:24	4 3:16,17
23:12 24:1	25:19	55:17 56:5	<b>zero</b> 26:19	<b>18TH</b> 1:1	11:9 19:21
24:6,10,16	28:16 36:3	58:9,18	<b>Zoom</b> 5:3	<b>1987</b> 34:3	19:21 20:4
24:18	36:8,20	60:23	34:12	<b>1999</b> 37:22	23:9 25:19
26:14,19	42:13	<b>WITNESS'</b>		37:25	34:8 38:14
26:19	50:13	61:1	<u>0</u>		38:15
27:21	<b>way</b> 15:8	<b>word</b> 15:20	<b>0.005</b> 13:19	<u>2</u>	54:19
28:13,16	16:2,3	16:11 28:8	<b>005</b> 13:2	<b>2</b> 3:15 7:7	<b>4.0</b> 10:11
29:2,7	19:6 22:15	32:9	14:2	8:25 9:2	<b>4.6</b> 11:7
33:5 40:6	27:4 29:20	<b>words</b> 12:19		49:5 50:5	<b>43</b> 7:11
<b>verified</b>	41:21 43:1	15:25	<u>1</u>	51:3	<b>440</b> 42:12
51:23 52:1	43:1,2	28:13 33:5	<b>1</b> 3:14 6:22	<b>2.16</b> 38:19	
62:17	<b>we'll</b> 6:21	35:13	6:23 32:22	<b>2.16.1</b> 48:19	<u>5</u>
<b>verify</b> 8:18	8:1,5,8	37:15	33:3 49:25	49:5,9	<b>5</b> 3:3,18 11:8
51:21	37:13	50:20	50:19	<b>2.4</b> 13:10,14	23:10
<b>version</b>	38:14	51:16	<b>1.4</b> 10:12	13:22 14:4	25:19 55:2
40:19	56:13	54:16	11:8	14:8 15:3	56:13,15
48:25	<b>we're</b> 8:9,15	62:15,17	<b>10</b> 10:11,12	15:5 21:19	<b>56</b> 3:18
<b>versus</b> 1:8	20:4 22:12	<b>work</b> 9:25	11:7,8	23:5,12	
12:3 42:2	30:5 33:19	17:7 22:15	37:2	<b>20</b> 3:16	<u>6</u>
<b>vertical</b>	36:11 37:4	<b>worked</b> 9:14	<b>10:12</b> 37:8	<b>2003</b> 38:4	<b>6</b> 3:14
10:10 11:2	52:11 57:7	<b>working</b>	<b>10:42</b> 57:8	<b>2015</b> 20:20	<b>601</b> 2:5
12:3,6	57:10 59:1	47:15	<b>10:42-10:52</b>	25:4,12	<b>63</b> 3:5 63:9
<b>viable</b> 8:22	<b>we've</b> 10:21	<b>works</b> 25:25	57:9	28:22 33:7	<b>69</b> 47:25
<b>video</b> 5:5	18:24	<b>wouldn't</b>	<b>10:52</b> 57:11	<b>2016</b> 10:14	
<b>VIDEOC...</b>	27:20	53:12	<b>10:55</b> 59:2,3	<b>2022</b> 1:21	<u>7</u>
1:20	<b>weak</b> 23:18	<b>write</b> 10:9	<b>110</b> 44:5	5:4 56:18	7 3:15 9:1
<b>VIDEOED</b>	<b>weight</b> 32:3	11:1 12:23	<b>110,000</b>	60:24	10:13
2:24	<b>well-establ...</b>	13:8	42:17,18	61:25	<b>70130</b> 2:6
<b>VIDEOG...</b>	13:16	<b>written</b>	42:21	<b>22</b> 1:21	<b>70507</b> 2:13
5:1 20:5	<b>wells</b> 11:5	39:25	43:24 44:2	60:24	<b>78953</b> 1:5
34:6,24	12:11 23:4	<b>wrote</b> 38:9	44:6,13	61:25	<b>79</b> 38:23
37:4,7	39:5,8		53:10	<b>22nd</b> 5:4	
57:7,10	<b>went</b> 10:19	<u>X</u>	58:19	<b>24</b> 25:20	<u>8</u>
58:25	<b>west</b> 9:12,13	X 3:1,12,12	<b>12</b> 9:15	<b>250</b> 30:16	<b>8</b> 10:11 34:1
<b>videotaped</b>	9:18,22		<b>12,000</b> 24:22	42:14	<b>822</b> 2:12
1:18 5:2	15:3 22:5	<u>Y</u>	29:23	43:20 44:4	<b>87</b> 34:17
	22:16 23:7	<b>year</b> 13:10	30:14	44:17	
<u>W</u>	24:25	13:14,22	31:18	45:22	<u>9</u>
<b>waived</b> 4:12	<b>western</b>	14:4,8	<b>12,400</b> 36:12	<b>2655</b> 2:6	<b>9</b> 3:14,15
<b>want</b> 9:15	22:12	15:2,4,5,6	50:15	<b>28</b> 25:20	6:21 34:8
15:10	28:20	16:13	<b>124</b> 43:18	62:4	<b>9:00</b> 1:21
16:11	<b>witness</b> 4:5	21:19 23:5	44:3,17		<b>9:02</b> 5:5
25:15 29:9	4:25 18:1	23:12 29:6	46:11	<u>3</u>	<b>9:58</b> 37:5
32:1 33:22	19:16,25	39:13,14	<b>13</b> 3:17	<b>3</b> 3:16 10:6	<b>9:58-10:12</b>
33:24	22:1 24:5	39:17,18	20:20	20:5,6,8	37:6
39:17,18	24:14 25:2	39:20	38:13	34:2 49:5	<b>9200.4-17P</b>
42:25 43:4	30:4 33:18	40:13 53:3	<b>139</b> 8:4	53:15,23	38:3
44:17	34:3 36:16	53:7	<b>13th</b> 25:4,12	<b>31st</b> 56:18	<b>97018</b> 62:25
47:20	36:24 41:4	<b>years</b> 7:22	28:22	<b>32</b> 52:5	63:25
<b>wanted</b>	41:20 42:1	9:15 39:19	<b>1434</b> 63:19	<b>37:2554</b> 63:8	
19:22	46:23 47:4	39:23	<b>1434(B)</b> 62:5	<b>38</b> 3:17	
<b>water</b> 11:16	48:25	47:15 52:5	<b>16</b> 19:23		
11:16,18	51:10 52:4		<b>17</b> 19:23	<u>4</u>	