

Exhibit 56

1 UNITED STATES DISTRICT COURT
2 FOR THE EASTERN DISTRICT OF NORTH CAROLINA
3 SOUTHERN DIVISION

4 IN RE: CAMP LEJEUNE)
5 WATER LITIGATION,)
6)
7) Case No.
8) 7:23-CV-00897
9)

10 VIDEO DEPOSITION OF
11 DAVID SABATINI, PH.D, PE, BCEE

12 TAKEN ON BEHALF OF THE UNITED STATES

13
14 IN OKLAHOMA CITY, OKLAHOMA

15
16 ON APRIL 11, 2025, AT 9:03 A.M.

17
18
19
20
21
22 REPORTED BY: LANA L. LEDFORD, CSR

23
24
25

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

A P P E A R A N C E S

For the Plaintiffs:

Laura J. Baughman
Devin Bolton (Via Zoom)
WEITZ & LUXENBERG
700 Broadway
New York, New York 10003
(212)558-5915
lbaughman@weitzlux.com

For the Defendants:

Alanna Horan
1100 L St
Washington, KC 20005
alanna.r.horan@usdoj.gov

Allison O'Leary
310 New Bern Avenue
Raleigh, North Carolina 27601
allison.o'leary@usdoj.gov

ALSO PRESENT VIA ZOOM:

Deanna Havai, Motley Rice
Giovanni Antonucci (DOJ)
Haroon Anwar (DOJ)
Kailey Silverstein (DOJ)
Dennis Reich
Morris Maslia, PE
Remy Hennet, PE
Zina Bash, Keller Postman

VIDEOGRAPHER: Stesha Ferguson

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

T A B L E O F C O N T E N T S

	PAGE
PLAINTIFFS' EXHIBITS	3
GOVERNMENT EXHIBITS.	4
STIPULATIONS	5
EXAMINATION BY MS. HORAN	6
EXAMINATION BY MS. BAUGHMAN.	324
FURTHER EXAMINATION BY MS. HORAN	345
JURAT.	353
CORRECTION SHEET	354
REPORTER'S CERTIFICATE	355

P L A I N T I F F S ' E X H I B I T S

NO.	DESCRIPTION	PAGE
1	Memorandum.	337
	CLJA_USMCGEN_0000003331-3333	

G O V E R N M E N T E X H I B I T S		
NO.	DESCRIPTION	PAGE
1	Email Chain	16
	CL_PLG_EXPERT_SABATINI_0000002426-2442	
2	Expert Rebuttal Report of David Sabatini.	27
	Ph.D, PE, BCEE, 1-14-25	
3	January 2025 Rebuttal-Expert Report of.	28
	David Sabatini, D, PE, BCEE	
4	Handwritten Notes	62
5	Hadnot Point Bldg #20	101
6	Color Photos.	104
7	Operator's Unit Direct Support Manual .	116
8	EPA Unit 8 Drinking Water Tech Tips . .	173
9	Volatilization From Water, Richard G.	186
	Thomas	
10	ATSDR	207
11	Rebuttal Response to:	229
12	Expert Report of Morris L. Maslia, PE, .	241
	D.WRE, DEE, Fellow EWRI	
13	Transcript of Deposition of Ernest Hunt	291
14	Camp Lejeune Justice Act Litigation . .	300
	Rebuttal Report of Kyle Longley	
21	Page 105, Line 23: Testimony marked at the	
	request of Ms. Baughman	

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

S T I P U L A T I O N S

It is hereby stipulated and agreed by and between the parties hereto, through their respective attorneys, that the deposition of DAVID SABATINI, PhD., PE, BCEE may be taken on behalf of the UNITED STATES on APRIL 11, 2025, in OKLAHOMA CITY, OKLAHOMA, by Lana L. Ledford, Certified Shorthand Reporter for the State of Oklahoma, pursuant to notice and Federal Rules of Civil Procedure.

* * * * *

1 THE VIDEOGRAPHER: This is the
2 videotaped deposition of David Sabatini. Today's
3 date is April 11, 2025, and we are on the record
4 at 9:03 a.m. Will counsel please state their
5 appearances for the record.

6 MS. BAUGHMAN: Laura Baughman for the
7 Plaintiffs.

8 MS. HORAN: Alanna Horan here on behalf
9 of the United States, and I'm joined by my
10 colleague, Allison O'Leary.

11 MS. HORAN: Good morning, Dr. Sabatini.

12 DR. SABATINI: Good morning.

13 MS. HORAN: I'm sorry. I think we need
14 to do the oath first.

15 THE VIDEOGRAPHER: The court reporter
16 will now swear the witness.

17 DAVID SABATINI, Ph.D, PE, BCEE,
18 of lawful age, being first duly sworn, deposes
19 and says in reply to the questions propounded as
20 follows:

21 * * * * *

22 EXAMINATION

23 BY MS. HORAN:

24 Q Good morning, Dr. Sabatini. Could you
25 please state your full name for the record?

1 A David Allen Sabatini.

2 Q And what is your current address?

3 A Current...

4 Q Address.

5 A Address.

6 1632 Crestmont, C-r-e-s-t-m-o-n-t,
7 Avenue, Norman, Oklahoma 73069.

8 Q And do you currently have a work office
9 that you go to on a regular basis?

10 A I'm an emeritus professor so I have an
11 office I go to several times a week.

12 Q And where is that office?

13 A It's at the University of Oklahoma.

14 Q Have you been deposed before?

15 A I was deposed once before about 40 years
16 ago on work that I did for the railroad. But
17 that was a short hour-or-two-long deposition
18 about work that I had done.

19 Q And I understand it was 40 years ago.
20 But to the best of your recollection, what was
21 that deposition about?

22 A It was about railroad right-of-way, and
23 a farmer had built a dike to try and prevent
24 flooding onto his land which was encroaching upon
25 increased water levels on the railroad

1 right-of-way -- the railroad elevated tracks. So
2 the concern was what they did would have damage
3 -- what the farmer had done would damage railroad
4 property.

5 Q And were you in your capacity as an
6 expert in that case?

7 A I was -- it was based on work I had done
8 for the railroad. So I was testifying to work I
9 had done for the railroad.

10 Q And you've only been deposed that one
11 time?

12 A That's the only time. Once.

13 Q So as, I think you know, I represent the
14 United States in this matter. And you understand
15 that you're obligated to tell the truth today?

16 A Yes.

17 Q A court reporter is taking down
18 everything that we say. It's important that you
19 answer verbally. For example, you must say "yes"
20 or "no" rather than nodding or shaking your head.

21 Does that work?

22 A Yes.

23 Q Off to a good start.

24 Please talk at a reasonable pace. The
25 pace I'm speaking at is fine. You seem to speak

1 at a very reasonable pace as well. But just to
2 make sure that the court reporter can take down
3 everything we say. Fair?

4 A Fair.

5 Q We'll do our best not to interrupt each
6 other just so the court reporter, again, can take
7 down all of our complete questions and your
8 complete answer. So I just ask that you please
9 wait until I finish my question before you start
10 to answer, and I will do my best not to interrupt
11 you when you're speaking as well.

12 Is that fair?

13 A Fair.

14 Q Once the deposition is complete, you'll
15 be -- you'll be given the opportunity to read the
16 transcript of your testimony and make any
17 corrections, and then you'll be asked to sign it.

18 Do you understand that?

19 A Understood.

20 Q Only you are testifying today. You must
21 answer to the best of your ability. And I just
22 ask that you not ask other people for their help
23 in answering any questions today.

24 Fair?

25 A Understood.

1 Q If you do not understand a question,
2 please let me know and I'll do my best to clarify
3 the question. If you don't ask for
4 clarification, I will assume that you understood
5 the question.

6 Is that fair?

7 A Fair.

8 Q Is there any reason why you're unable to
9 give your most truthful and accurate testimony
10 today?

11 A No.

12 Q What did you do to prepare for your
13 deposition today?

14 A I reviewed my expert rebuttal report and
15 associated reports.

16 Q What do you mean by "associated
17 reports"?

18 A I reviewed Hennes's expert report that I
19 was responding to. And I reviewed the AH
20 Environmental report that was pivotal. And I
21 reviewed the Nakasone paper that fed into the
22 losses over the weir and the spiractor. And the
23 McKone paper and the shower experiment.

24 Q So other than reviewing your expert
25 report, Dr. Hennes's report, the AH Environmental

1 report, the Nakasone study, and the McKone study,
2 did you review any other documents in preparation
3 for your deposition today?

4 A Possibly, in general. Just background
5 information. But not specific -- not to my
6 recollection. Oh, I reviewed Hennes's
7 deposition. That would have been specific.

8 Q Did you review any other depositions
9 beyond Dr. Hennes's?

10 A That's not -- not to my recollection.

11 Q Did you meet with anyone to prepare for
12 your deposition today?

13 A I met with counsel yesterday to go over
14 being the first time as an expert, in
15 preparation.

16 Q And for how long did you meet with
17 counsel yesterday?

18 A We met for two or three hours in the
19 morning and then hour or two in the afternoon.

20 Q Besides Ms. Baughman, who I believe --

21 A Yes.

22 Q -- may have been the counsel you were
23 with yesterday --

24 A Yes. Yes.

25 Q -- was anyone else present for that

1 prep?

2 A Not in person.

3 Q Who joined you remotely?

4 A Devin Bolton and Kevin Dean.

5 Q Have you testified in court before?

6 A No.

7 Q And I believe you said this is your
8 first time serving as an expert witness in a
9 case?

10 A Yes. Correct.

11 Q Have you read the complaint in this
12 case?

13 A I'm sorry? The...

14 Q The complaint.

15 A Yes. Early on, I did, as I recall. The
16 complaint. What -- refresh my memory of the
17 complaint.

18 Q Sure.

19 So a complaint is a document wherein the
20 Plaintiffs state what their allegations are.

21 Do you recall reading a document like
22 that at any point?

23 A I think I may have, several years ago.

24 Q And to the best of your understanding,
25 what are the Plaintiffs' allegations in this

1 case?

2 MS. BAUGHMAN: Object to the form.

3 THE WITNESS: Not remembering,
4 specifically, the document, I'd be hesitant to
5 speak to that.

6 Q (BY MS. HORAN) Sure.

7 So setting aside the complaint document,
8 just generally, what is your understanding of
9 what the Plaintiffs' claims are in this case?

10 MS. BAUGHMAN: Object to the form.

11 THE WITNESS: It's kind of an open-ended
12 question. Can you be more specific?

13 Q (BY MS. HORAN) I'm just trying to
14 understand what -- what you believe the
15 Plaintiffs' allegations are. It's not -- it's
16 just your understanding.

17 A Okay.

18 Q And it could come from any source kind
19 of. You've -- sounds like you've been working on
20 this for -- for a while, based on your billing
21 records. So really just generally, what your
22 understanding is.

23 MS. BAUGHMAN: Same objection.

24 THE WITNESS: The -- that there was
25 groundwater contamination that resulted in

1 drinking water contamination and that there was
2 exposure as a result.

3 Q (BY MS. HORAN) Do you personally know
4 anyone with a pending lawsuit or administrative
5 claim against the United States related to their
6 time at Camp Lejeune?

7 A No.

8 Q Do you know -- or strike that.
9 Have you ever spoken, in person or via
10 email, with a man named Ernest Hunt?

11 A I'm sorry? With...

12 Q With a man named Ernest Hunt.

13 A I've had no personal contact.

14 Q Have you ever spoken, in person or via
15 email, with a man named Mark Cagiano?

16 A No.

17 Q Have you ever spoken, in person or via
18 email, or text message, phone, any of those, with
19 a man named Jerry Ensminger?

20 A No.

21 Q Have you ever spoken, in person or via
22 email, phone, any form of communication, with a
23 man named Mike Partain?

24 A No.

25 Q When were you retained in this matter?

1 A It was in April of -- two years ago.

2 Q So April 2023?

3 A '23. Yes.

4 Q And how did you -- or strike that.

5 You were retained by the Bell Legal
6 Group; is that right?

7 A Yes.

8 Q And do you recall if they contacted you
9 or if you contacted them?

10 A They contacted me.

11 Q Had you previously worked with anyone
12 from the Bell Legal Group?

13 A No.

14 Q Do you recall the name of the attorney
15 that called you?

16 A Pat Telan. T-e-l-a-n.

17 Q Not exclusive to the Bell Legal Group,
18 but have you ever worked with any of the counsel
19 in this case before?

20 A No.

21 Q Giving your best estimate, roughly how
22 many hours have you spent working on this case?

23 MS. BAUGHMAN: Objection to form.

24 THE WITNESS: I'd have to refer to my
25 records. I don't recall a specific -- a number.

1 Q (BY MS. HORAN) And you've been billing
2 hours since April of 2023. Is that fair?

3 A Yes.

4 Q And your billing records would be the
5 best place to find out how many hours you've
6 worked on the case?

7 A Yes.

8 (Government Exhibit 1 marked for identification)

9 Q (BY MS. HORAN) I'm marking as Exhibit
10 1. This is a document with the Bates
11 CL_PLG-Expert_Sabatini_0000002426. And it runs
12 through the Bates ending in 2443.

13 MS. BAUGHMAN: So what she's reading is
14 just the number at the bottom.

15 THE WITNESS: Okay.

16 MS. BAUGHMAN: Okay.

17 THE WITNESS: Okay.

18 MS. BAUGHMAN: He doesn't know. Just so
19 he understands. Okay.

20 Q (BY MS. HORAN) And if you have any
21 questions like that, please feel free to ask
22 them.

23 A Thank you.

24 Q We want to make sure you're on the same
25 page as me.

1 A Thank you.

2 Q Dr. Sabatini, do you recognize these as
3 your billing records?

4 A Yes.

5 MS. HORAN: So I'll just put on the
6 record, I've looked and I've only been able to
7 find billing records for the calendar year 2024.
8 So we would just request the records from April
9 '23 to December '23, and then any from 2025.

10 MS. BAUGHMAN: So to the best of my
11 knowledge, there aren't any from 2023. You can
12 ask him, but I'm not aware of them. And I don't
13 think they exist for 2025 yet.

14 THE WITNESS: Yeah. I've not --

15 MS. BAUGHMAN: But you can ask him --

16 THE REPORTER: Wait. One at a time,
17 please.

18 MS. BAUGHMAN: Yeah. Remember, don't --
19 only --

20 THE WITNESS: I'm sorry.

21 MS. BAUGHMAN: -- one person at a time.

22 THE WITNESS: I'm sorry.

23 MS. BAUGHMAN: And you should only speak
24 when she asks you a question. Okay?

25 THE WITNESS: Okay.

1 MS. BAUGHMAN: All right. Go ahead.

2 MS. HORAN: Sure.

3 Q (BY MS. HORAN) I think -- did you bill
4 in 2023 calendar year?

5 A From the best of my knowledge, yes.

6 Q So there would be a record of that
7 billing that you did in 2023; correct?

8 A That would be my understanding.

9 MS. HORAN: Okay. So we just request
10 those documents.

11 Q (BY MS. HORAN) And you have not billed
12 for 2025 yet?

13 A No.

14 Q Okay. And since January, roughly how
15 many hours do you think you've worked on this
16 case?

17 A I'd have to refer to my records.

18 Q Sure.

19 Looking at your billing records, prior
20 to receiving the DOJ reports in December of 2024,
21 you had drafted and finalized an expert report.

22 Fair?

23 MS. BAUGHMAN: Objection to form.

24 THE WITNESS: I had worked on a
25 document. Yes.

1 Q (BY MS. HORAN) And in your billing
2 records, you refer to that document as expert
3 report. Fair?

4 A In the billing. Yes.

5 Q And you did not file that expert report
6 in this case; correct?

7 MS. BAUGHMAN: Objection to form.

8 THE WITNESS: I'd have to defer to
9 counsel.

10 Q (BY MS. HORAN) You don't know one way
11 or the other whether that document was ever
12 filed?

13 A To my knowledge, it --

14 MS. BAUGHMAN: Objection to form.

15 What do you mean filed? We don't file
16 expert reports.

17 MS. HORAN: That's a fair correction.

18 MS. BAUGHMAN: Okay.

19 Q (BY MS. HORAN) Do you know if that
20 document was ever provided to the United States?

21 A No. No. I mean not to my knowledge.

22 Q The first page of the Exhibit 1.

23 A Okay.

24 Q The second billing line is for January
25 9.

1 Do you see that?

2 A Yes.

3 Q And it's for .5 hours, and it says,
4 "Prep for 1/23 trip."

5 A Yes.

6 Q Where was that trip to?

7 A The trip did not happen.

8 Q Where was the trip anticipated to be?

9 A The trip was --

10 MS. BAUGHMAN: Wait. Hold on. I'm
11 going to object and just refer, for your sake,
12 and for Dr. Sabatini, to case management order
13 number 17 which says that communications between
14 expert and counsel are not discoverable.

15 So to the extent you need to answer any
16 question about why a trip didn't take place,
17 that's privileged --

18 THE WITNESS: Okay.

19 MS. BAUGHMAN: -- if it was a
20 communication with counsel.

21 Go ahead.

22 MS. HORAN: Are you claiming privilege
23 over where the trip was to?

24 MS. BAUGHMAN: Only if he has to rely on
25 communications with counsel to answer the

1 questions.

2 MS. HORAN: Okay.

3 Q (BY MS. HORAN) I'll ask you, Dr.
4 Sabatini, but please don't answer if you have to
5 rely on your communication with counsel to answer
6 it.

7 A Okay.

8 Q Where was the trip that you were
9 prepping for on January 9th to?

10 A That would cause me to rely upon
11 communications from counsel.

12 Q Okay.

13 MS. BAUGHMAN: I might have said the
14 wrong CMO. Just for the record, it's case
15 management order 17. I don't -- I'm not sure if
16 that's what I said. Just -- just to correct
17 that. But go ahead.

18 MS. HORAN: Sure.

19 Q (BY MS. HORAN) And Dr. Sabatini, we'll
20 go throughout the whole day. So to the extent I
21 ask you a -- I might not know.

22 A Uh-huh.

23 Q So to the extent I ask you a question
24 and you have to rely on your communications with
25 counsel to answer it, that rule applies

1 throughout the whole day.

2 A Thank you.

3 Q Okay. Could you please turn to the
4 document ending -- or the page ending in 2438?

5 A 2438.

6 Q The last three entries on that page for
7 June.

8 Do you see those?

9 A Yes.

10 Q And the entry next to June 11th says,
11 "Consider additional calculations/analytical
12 solutions."

13 Do you see that?

14 A Yes.

15 Q And the June 25th entry says, "Sample
16 calculations-mass/concentrations-Tarawa Terrace."

17 Do you see that?

18 A Yes.

19 Q And the June 28th entry says, "Sample
20 calculations-HPIA/HPLF."

21 Do you see that?

22 A Yes.

23 Q HPIA. What does that stand for?

24 A Hadnot Point Industrial Area.

25 Q And HPLF. What does that stand for?

1 A Hadnot Point Land Fill.

2 Q Could you turn to the last page, the
3 page ending in 43?

4 A (Witness complies.)

5 Q The last billing entry for December 31st
6 says, "Finalizing rebuttal report/Zoom call with
7 Morris Maslia."

8 Do you see that?

9 A Yes.

10 Q Did you finalize your rebuttal report on
11 December 31st or did you continue to work in --
12 work on it into January?

13 A I -- as I recall, we had an extension
14 which allowed additional time.

15 Q So you continued to work on it into
16 January. Fair?

17 A I don't recall specifically because I
18 was targeting the earlier completion date. So I
19 don't recall. I think -- believe I did do some
20 additional work.

21 Q And the answer to that question would be
22 in your billing records. Fair?

23 A Yes.

24 Q What is your practice with how often you
25 bill the attorneys?

1 A Initially, it was I sent monthly. And
2 then at some point last year, Lori Mertz
3 recommended quarterly. So I transitioned toward
4 quarterly billing towards the end of last year.

5 Q And you haven't billed for Q1 of 2025
6 yet?

7 A No.

8 Q Do you anticipate doing that soon?

9 A Probably sometime in the future.

10 MS. HORAN: We would just request those
11 when they become available.

12 Q (BY MS. HORAN) The second half of the
13 last entry on Page 43 says, "Zoom call with
14 Morris Maslia."

15 When did you first meet Morris Maslia?

16 MS. BAUGHMAN: Hold on one second. Just
17 -- just to be clear. So you know. Okay? Case
18 management order 17 says you don't talk about
19 your communications with --

20 THE WITNESS: Right.

21 MS. BAUGHMAN: -- other experts. But
22 when you --

23 THE WITNESS: When. Time.

24 MS. BAUGHMAN: You can answer that
25 question. Okay? Go ahead.

1 THE WITNESS: Okay. Thank you.

2 I've not met Morris Maslia in person.

3 Q (BY MS. HORAN) When did you first speak
4 with Morris Maslia?

5 A As I recall, there was a general
6 information Zoom with --

7 MS. BAUGHMAN: Just when.

8 THE WITNESS: When. When. Thank you.

9 In mid to late '23.

10 Q (BY MS. HORAN) And do you recall who
11 else was on that Zoom in end of 2023?

12 A There were multiple people, but I don't
13 recall. That was so long ago.

14 Q And roughly how many times have you
15 spoken with Morris Maslia since then?

16 A Two times. At most, three.

17 Q Besides Morris Maslia, to the best you
18 can recall, have you spoken with any other
19 Plaintiffs' experts?

20 A Not that I recall. I'm trying to think
21 through. No.

22 Q You don't recall ever speaking with a
23 man named Dr. Aral Mustafa?

24 A No.

25 Q Have you ever spoken with Dr. Konikow?

1 A No. Well, not related to this case.

2 Q Had you previously worked with Dr.
3 Konikow?

4 A Well, I was trying to -- I may have met
5 him at a conference years ago.

6 Q Do you recall ever speaking with Jones
7 or Davis?

8 A No.

9 Q Did you have any help in preparing your
10 expert report? And again, I'm not asking about
11 attorneys.

12 MS. BAUGHMAN: So not lawyers. Anyone
13 else.

14 THE WITNESS: Say again?

15 MS. BAUGHMAN: Okay. She's asking you
16 if you had help preparing your report, but she's
17 not talking about any lawyers or anyone who's
18 employed by a lawyer.

19 THE WITNESS: No.

20 Q (BY MS. HORAN) So no grad students or
21 anything?

22 A No.

23 Q Okay. Did you write your expert report
24 yourself?

25 A Yes.

1 Q Okay. You can put Exhibit 1 to the
2 side.

3 A (Witness complies.)

4 MS. BAUGHMAN: So we just keep, like, a
5 stack because sometimes she might go back to
6 these. Okay.

7 THE WITNESS: Okay.

8 (Government Exhibit 2 marked for identification)

9 Q (BY MS. HORAN) I'm marking as Exhibit 2
10 -- this is a document with the title Expert
11 Rebuttal Report of David Sabatini Ph.D, PE, BCEE,
12 January 14, 2025.

13 Take as long as you'd like to flip
14 through it, but do you recognize this as your
15 written expert report that you submitted in this
16 case?

17 A Yes. At least the cover page certainly.
18 I assume the rest of the document.

19 Q Do you want to flip through it just to
20 make sure it's all there?

21 A Sure. Let me...

22 MS. BAUGHMAN: Do you want him to look
23 at every page or what do you want him to do?

24 MS. HORAN: Just generally.

25 THE WITNESS: Make sure there's -- this

1 looks -- it looks complete. Yes.

2 Q (BY MS. HORAN) All right. And this is
3 the report that you reviewed in preparation for
4 your deposition today?

5 A Yes.

6 Q Having reviewed your report in
7 preparation for today, are there any corrections
8 to the opinions you offered that you would like
9 to make?

10 A No.

11 Q You can set that to the side.

12 A (Witness complies.)

13 (Government Exhibit 3 marked for identification)

14 Q (BY MS. HORAN) I'm marking as Exhibit 3
15 -- this is a document with the title January 2025
16 Rebuttal Expert Report of David Sabatini
17 Supplemental Amended Materials Considered List
18 dated April 9, 2025.

19 Dr. Sabatini, does -- do you recognize
20 this document?

21 A Yes.

22 Q Have you seen it before?

23 A Yes.

24 Q And you recognize this as your
25 supplemental materials considered list. Fair?

1 A Yes.

2 Q We -- does this include all of the
3 materials you reviewed as an expert?

4 A To the best of my knowledge, yes. I
5 mean, there were so many documents, but yes, this
6 -- yes.

7 Q Is there anything you've reviewed since
8 April 9th that you would like to add to this list
9 today?

10 A No.

11 Q So the materials considered list that we
12 originally received in January went to Page 8,
13 and then everything from Page 9 onward was added
14 to the April 9, 2025 list.

15 Is that your understanding that there
16 was an update on April 9th?

17 A That's my understanding. Yes.

18 Q So since filing your report in January
19 of 2025, you've since reviewed these 21 pages of
20 materials? Is that fair?

21 MS. BAUGHMAN: Objection to form.

22 THE WITNESS: Yes.

23 Q (BY MS. HORAN) And when did you first
24 receive the information -- or strike that.

25 When did you first receive the documents

1 on Pages 9 through 30 of this list?

2 A I don't recall.

3 Q Did you review any of the materials on
4 Page 9 through 30 of your materials considered
5 list prior to submitting your rebuttal report in
6 January?

7 MS. BAUGHMAN: Objection to form.

8 THE WITNESS: I may have, but I don't
9 recall.

10 Q (BY MS. HORAN) Have you reviewed all of
11 the materials, all 30 pages of these materials?

12 A To varying degrees, yes.

13 Q The materials in -- listed on Page 9
14 through 30 are not directly cited in your
15 rebuttal report.

16 Is that fair?

17 MS. BAUGHMAN: Objection to form.

18 THE WITNESS: To the best of my
19 recollection.

20 Q (BY MS. HORAN) Could you turn to Page
21 11? It starts on Page 11 at the very bottom. Or
22 strike that. It's actually on Page 12.

23 On Page 12 of your materials considered
24 list, you have a number of depositions listed.

25 Do you see that?

1 A Yes.

2 Q You mentioned that you reviewed Dr.
3 Hennessey's deposition in preparation for today.
4 Looking at this list now, did you review any
5 other depositions in preparation for today?

6 A I looked at the deposition of Ernest
7 Hunt and Mark Cagliano.

8 Q Have you read all of the depositions
9 listed on Page 12?

10 A To varying degrees.

11 Q When you say "to varying degrees," what
12 -- what do you mean?

13 A Some in detail and some just briefly.
14 Some were more pertinent than others.

15 Q Have you attended any depositions in
16 this matter?

17 MS. BAUGHMAN: Objection to form.
18 Do you mean in person or...

19 Q (BY MS. HORAN) No. Remotely or in
20 person. At all in any way. Phone call.

21 A Yes.

22 Q Which ones have you attended remotely,
23 in person, or a phone call?

24 A One.

25 Q And which one was that?

1 A Hennes.

2 Q The materials you have listed on Page
3 9 --

4 A I don't know if this is worth
5 commenting. Some of these CLJs may have been in
6 my appendix. I'm not sure.

7 Q When you say appendix, Dr. Sabatini, are
8 you referring to the water buffalo Appendix A?

9 A Yes.

10 Q Now, that has its own materials
11 considered list.

12 A Okay.

13 Q Is that fair? Or -- you're welcome to
14 look at your report next to you if you'd like.

15 A Yes.

16 Q So are those separate materials
17 considered lists or is this materials considered
18 list inclusive of all of your documents?

19 MS. BAUGHMAN: If you know.

20 THE WITNESS: Yeah, I -- I'm not clear.
21 I'm not sure. Trying to be comprehensive.

22 Q (BY MS. HORAN) Sure.

23 Why did you provide a second materials
24 considered list with your Appendix A as opposed
25 to just one for the entire report?

1 MS. BAUGHMAN: Objection to form.

2 THE WITNESS: I'm not sure. Can you --

3 Q (BY MS. HORAN) Sure.

4 A I'm not sure the question.

5 Q Sure.

6 So your Appendix A has a materials
7 considered list -- and again, you're welcome to
8 look at it.

9 A Yeah.

10 Q Why did you decide to provide its own
11 materials considered list with your Appendix A --

12 MS. BAUGHMAN: Objection to form.

13 Q (BY MS. HORAN) -- separate from the one
14 attached to your report?

15 MS. BAUGHMAN: Objection to form.

16 Well, this wasn't attached to his
17 report. Exhibit 3 was not attached to his
18 report. So I'm going to object to that.

19 MS. HORAN: Sure.

20 Q (BY MS. HORAN) So separate from the one
21 that was on April 9th, you have a materials
22 considered list affixed to your Appendix A.

23 A Yeah.

24 Q Is that fair?

25 A These were pertinent to the report, and

1 my only --

2 MS. BAUGHMAN: It's a reference list;
3 it's not a materials considered list. So I'm
4 going to object to that.

5 THE WITNESS: I guess the only thing I
6 was trying to comment, I didn't know if -- in an
7 effort to be comprehensive, if some of these
8 might have also been listed here.

9 Q (BY MS. HORAN) Okay. So you're not
10 sure?

11 A No.

12 Q Okay. Since submitting your expert
13 report in January of 2025, why did you decide to
14 review the documents in Pages 9 through 30?

15 MS. BAUGHMAN: Object to the form.

16 THE WITNESS: I don't recall.

17 Q (BY MS. HORAN) Okay. You can set that
18 aside.

19 A (Witness complies.)

20 Q Could you turn to Exhibit B of -- of
21 Exhibit 2 which is your expert report? I believe
22 it is your resumé.

23 A My vitae?

24 Q Yes.

25 Any changes since you've submitted this

1 vitae in December of 2024?

2 A I believe not. I don't think there's
3 any articles. Book six is almost released. But
4 I don't think it's yet released. On Page 3.
5 Book six. So that may have an April date on it.

6 Q And that's Surfactant Formulation
7 Engineering Using HLD and NAC.

8 A Yes.

9 Q That book.

10 A Yes.

11 Q And you're a co-author on that book?

12 A Yes.

13 Q Other than that that book might have
14 been released by now, anything else that you can
15 think of?

16 A Minor detail, but then a couple of the
17 chapters in that book will also -- dates will be
18 updated.

19 Q Sure.

20 A So co-edited, co-authored the book, and
21 then several chapters in the book.

22 Q Sure.

23 Anything else?

24 A No.

25 Q Presently, your professional roles

1 include the associate director of the Institute
2 for Applied Surfactant Research, you are an
3 adjunct professor at the University of Ethiopia,
4 and one university in Thailand.

5 A Correct.

6 Q And you are a partner at Surfactant
7 Associates.

8 A Yes.

9 Q Is that an accurate summary of your
10 present professional roles?

11 A Yes.

12 Q In this case are you contracted directly
13 and personally with the Plaintiffs' leadership
14 group or is it through an entity?

15 MS. BAUGHMAN: Objection to form.

16 THE WITNESS: I'm sorry. Ask again.

17 Q (BY MS. HORAN) Sure.

18 So are you contract -- let me rephrase.

19 You have a role in a number of
20 organizations. Is your contract to do work on
21 this case with one of those entities and then you
22 work on it or is it with -- directly with you?

23 A Directly with me.

24 Q And you received a bachelor's degree in
25 civil engineering from the University of Illinois

1 in 1981?

2 A Correct.

3 Q And you received a master's degree in
4 civil engineering from Memphis State in 1985?

5 A Correct.

6 Q And you received a Ph.D from Iowa State
7 University in 1989?

8 A Correct.

9 Q What is your Ph.D in?

10 A It's in civil engineering. With an
11 environmental emphasis.

12 Q What does that mean?

13 A Within civil engineering, there's
14 structural engineering, geotechnical engineering,
15 transportation engineering, and environmental
16 engineering. So my specialty was in the
17 environmental engineering side of civil
18 engineering.

19 Q You have a paper listed. "Sorpton and
20 transport of Atrazine Alachlor and Fluorescent
21 Dyes in Alluvial Aquifer Sands."

22 Was that your Ph.D thesis?

23 A Yes. Part of it.

24 Q What was the other part? If you could
25 identify it for us.

1 A I'd have to remember back at my papers,
2 but there was another paper that was published
3 out of my dis-- but it was same topic.

4 Q Was it published around the same time?

5 A Yes.

6 Q After your Ph.D, you became an assistant
7 professor and then a full professor at the
8 University of Oklahoma?

9 A Assistant, and then associate, and then
10 full. Yes.

11 Q And I believe you said now, you're a
12 professor emeritus?

13 A Emeritus. Yes. No problem.

14 Q Sorry about that.

15 A No problem.

16 Q And do you still teach classes?

17 A Yes.

18 Q What classes do you teach?

19 A I teach a course on fundamentals of
20 water security, quantity, quality, and equity in
21 a changing climate.

22 Q Anything else?

23 A That's the only university course I
24 teach. I teach a short course to industry.

25 Q And what course is that?

1 A It's fundamental and applied aspects of
2 surfactants.

3 Q And you teach that to the industry you
4 said?

5 A Yes.

6 Q So what does that mean?

7 A We go to industries that -- as associate
8 director of the Institute for Applied Surfactant
9 Research, we have industrial sponsors of our
10 institute and they ask us to come and teach a
11 two-and-a-half-day short course at their company.
12 And we'll go -- my colleague and I go and we team
13 teach -- trade off teaching -- for two and a half
14 days, this course to chemical companies.

15 Q In either of those courses, the one to
16 students or the one to industry, do you talk
17 about Camp Lejeune?

18 A Briefly in the water security, in one
19 lecture, I briefly mention that -- I talk about
20 superfund and show a map of the United States of
21 all the superfund sites. And then I mention that
22 Camp Lejeune is one of those contaminated sites.

23 Q Besides that one mention in terms of
24 superfund sites --

25 A No. That's all.

1 Q No.

2 Is there a PowerPoint or anything you
3 put together for that class?

4 A Yes.

5 Q We would just request a copy of that
6 PowerPoint.

7 A Okay.

8 MS. BAUGHMAN: Well, we'll talk about
9 that later. I don't -- you didn't -- I mean
10 there was no official request for that so I don't
11 think we'll be providing that. But you can
12 follow up with me. I didn't see a document
13 request for such a document.

14 MS. HORAN: Sure. We can deal with that
15 on the back end, but we just request it.

16 THE WITNESS: Okay.

17 Q (BY MS. HORAN) And you as a professor
18 emeritus --

19 MS. BAUGHMAN: Emeritus.

20 Q (BY MS. HORAN) Emeritus.

21 THE WITNESS: Yeah.

22 Q (BY MS. HORAN) -- are you retired from
23 your role as a professor or do you -- is that
24 considered a retirement role or how does that
25 work?

1 MS. BAUGHMAN: Objection to -- objection
2 to the form.

3 THE WITNESS: It's my -- I don't -- I
4 don't know how to say this. Quazi retired.

5 Q (BY MS. HORAN) Quazi retired.

6 Do you still get a salary from the
7 University of Oklahoma?

8 A When I teach a course, I do. But not on
9 a monthly -- when I'm not teaching a course, I
10 don't.

11 Q You're a professional engineer; correct?

12 A Correct.

13 Q And you've taken and passed both of the
14 professional engineer tests?

15 A Yes.

16 Q Have you ever failed a test to become a
17 professional engineer?

18 A No.

19 Q Your report has David Sabatini, Ph.D,
20 PE, BCEE on the front.

21 The PE stands for professional engineer?

22 A Correct.

23 Q What does the BCEE stand for?

24 A It stands for board certified
25 environmental engineer.

1 Q And could you describe for me what that
2 licensing or certification is?

3 A It's through the associate -- American
4 Association of Environmental Engineering and
5 Scientists. And it's -- you can gain that
6 designation either by taking a written and an
7 oral exam -- or if you're considered a person of
8 eminence, your record can gain you that
9 recognition.

10 Q And when did you receive that
11 recognition?

12 A Oh, goodness.

13 Q More than 20 years ago? More than ten?

14 A I'd say 15 to 20 years ago. In that
15 range. I'd have to look to my records.

16 Q Sure.

17 And you would look at your resumé to
18 find that out?

19 A Say again.

20 Q Or where -- where would you look to find
21 that information out?

22 A I guess I don't have it on my resumé. I
23 think I do have my PE. But anyway, I'm not sure.

24 Q Other than your professional engineering
25 licensure and your BCEE certification or

1 licensure, do you have any other licenses?

2 A No.

3 Q You've worked on projects regarding
4 cleanup at military bases; correct?

5 A Correct.

6 Q And which projects have you worked on?

7 A Oh, there's a range. Hill Air Force
8 Base. Dover Air Force Base. What's the one in
9 California? Naval Air Station. Those are --
10 there are several. I'd have to look at my
11 records to remember.

12 Q Where -- where would you look to
13 remember?

14 A Should be in my...

15 Q It should be in your resumé?

16 A Yeah.

17 Q Okay. You mentioned Hill. Could you
18 describe your role in that project?

19 A The -- it was a research project to look
20 at developing advanced technologies for cleaning
21 up groundwater contamination.

22 Q You mentioned Dover. Could you
23 describe --

24 A The same -- same type. We developed a
25 technology in the laboratory and approved

1 successful so then we went to these field sites
2 to demonstrate.

3 Q You said "we". Who did you work with on
4 this project?

5 A Well, colleagues at the University of
6 Oklahoma.

7 Q Okay. And you mentioned one in
8 California.

9 A Yeah.

10 Q What was your role in that?

11 A Same. Field demonstration.

12 Q How did you become involved in the Hill
13 project?

14 A We competed nationally for a large
15 research grant to take our technology from the
16 laboratory into the field. It was funded by the
17 Environmental Protection Agency.

18 Q Is that the same way you became involved
19 with the Dover project? Or how did you become
20 involved there?

21 A That was the same program funding.

22 Q And is that the same with the California
23 project?

24 A Yes. That -- I'd have to look back at
25 my records. But yes, the same general. That may

1 have actually been our company. We started a
2 company, Surbec Environmental, that was
3 implementing our technology. That may have been
4 a Surbec project.

5 Q And the "we" is your colleagues at the
6 University of Oklahoma still?

7 A Yes.

8 Q You mentioned receiving funding from the
9 EPA; correct?

10 A Correct.

11 Q Have you ever received funding or grants
12 from any other government agency?

13 A Yes. Department of Defense. Department
14 of Energy. As I recall.

15 Q Did the grant you received from the
16 Department of Defense have anything to do with
17 groundwater?

18 A Remediation. Yes.

19 Q And what was that grant related to?

20 A I'd have to look back in my -- I'd have
21 to look -- same. I don't recall the specific
22 details. That's 30 years ago. Twenty-five years
23 ago.

24 Q Sure.

25 And then the -- do you recall what the

1 grant funding from the Department of Energy was
2 for?

3 A It's all related to the groundwater
4 remediation.

5 Q Were you involved in the groundwater
6 contaminant cleanup at Camp Lejeune?

7 A Say again.

8 Q Were you involved in the groundwater
9 contaminant cleanup or remediation at Camp
10 Lejeune?

11 A No.

12 Q Did you ever compete for a grant to be
13 involved in the Camp Lejeune contaminant cleanup?

14 A No. Not to my knowledge.

15 Q To the best of your memory, were you
16 ever asked to be involved in the contaminant
17 cleanup at Camp Lejeune?

18 A No.

19 Q Do you know anyone who was involved in
20 the contaminant cleanup at Camp Lejeune?

21 A Not to my knowledge.

22 Q Have you ever personally served in the
23 military?

24 A No.

25 Q Have you ever been to a military base?

1 A The bases that we described.

2 Q So part of your work with Hill, Dover,
3 and the project in California was you going to
4 the base.

5 A We were physically implementing the
6 technology at those sites.

7 Q Other than your -- through your
8 professional work on Hill, Dover, and the
9 California base, can you recall ever visiting any
10 other military bases?

11 A Tinker Air Force Base in Oklahoma City.
12 Military base in Germany where I taught a short
13 course, but that base was being closed. That's
14 all I can remember.

15 Q What was the course you taught in
16 Germany?

17 A It was on groundwater contamination
18 remediation.

19 Q And you said it was -- the base was
20 being closed? Is that fair?

21 A Say again.

22 Q Did you say that the base was being
23 closed?

24 A Yeah. They were -- yes.

25 Q Were you there to help them close the

1 base?

2 A No. No.

3 Q Why were you there?

4 A As part of reverting their base back to
5 the home country, there was value added in terms
6 of buildings, but there was value detracted by
7 virtue of contamination. And so the personnel
8 were gaining understanding of contamination
9 remediation to help understand that aspect of the
10 base reversal.

11 Q Have you ever been to Camp Lejeune?

12 A No.

13 Q Do you have any training or hist- -- or
14 strike that.

15 Do you have any training or education in
16 history?

17 A History? No.

18 Q Do you have any formal training or
19 education in historical military practices?

20 A No.

21 MS. BAUGHMAN: Wait. Wait. Did you
22 want to amend your answer?

23 THE WITNESS: Well, I mean, I've taken
24 several -- I guess it's not training. I've taken
25 several courses on Lincoln from history. And I'm

1 writing a book on Lincoln and engineering. So I
2 don't know if that constitutes the degree of --
3 and I guess I would say when we do research, we
4 -- it depends upon what you mean by history.
5 When we do research, we have to research the
6 history of what we're working on to be able to
7 build upon it. So anyway. That's -- I guess
8 that's what I wanted to say.

9 Q (BY MS. HORAN) Sure.

10 And your -- I believe you said your --
11 you've studied the Lincoln era and you're writing
12 a book on the Lincoln era.

13 Are there any other eras of history or
14 military history that you've spent more time
15 interested in?

16 A In saying that Lincoln was an engineer,
17 one of my advisors on my book said, well, write
18 about the engineering presidents. And three of
19 those were military academy graduates. So I've
20 studied their time period and their history. So
21 I don't know if that fits in to what you're
22 talking about or not. But that would be Grant,
23 Eisenhower, and Carter.

24 Q So have you spent any time studying or
25 received any education on historical military

1 practices from the 1950s to the 1980s?

2 MS. BAUGHMAN: Object to the form.

3 THE WITNESS: Well, Eisenhower is in
4 that period, but I guess I'd say no.

5 Q (BY MS. HORAN) Have you ever taught any
6 courses on history?

7 A I've given seminars. Not semester-long
8 courses, but I've given seminars on Lincoln.
9 Leadership Lincoln and engineering. Lincoln's
10 faith journey.

11 Q Other than seminars on Lincoln, have you
12 taught any other history seminars or courses?

13 A I teach a Bible class at church which
14 gets into a lot of history. But other than that,
15 I'd say no.

16 Q Could you turn back to Exhibit 2 which
17 is your report? Actually, I think you still have
18 it in front of you.

19 A I'm sorry. Which?

20 Q Your report. You've got it in front of
21 you.

22 A Okay. I thought you mentioned a page
23 number.

24 Q I'm going to get there. If you could
25 turn to Page 1 of Exhibit 2, the last sentence

1 reads, "My background and experience sufficiently
2 and uniquely qualify me to comment on the fate of
3 contaminants in Camp Lejeune water treatment
4 plants and distribution systems as well as the
5 ultimate delivery of contaminated drinking water
6 to marines and their family members."

7 Did I read that correct?

8 A Correct.

9 Q So you're not offering opinions in this
10 case on the fate and transport of contaminants in
11 the groundwater at Camp Lejeune.

12 Fair?

13 A Correct.

14 MS. BAUGHMAN: Object to the form.

15 THE WITNESS: Correct.

16 Q (BY MS. HORAN) And you're not offering
17 opinions on the fate and transport of
18 contaminants through the soil at Camp Lejeune;
19 correct?

20 MS. BAUGHMAN: Object to the form.

21 THE WITNESS: Correct.

22 Q (BY MS. HORAN) You can set that exhibit
23 aside.

24 A (Witness complies.)

25 Q When was the first time you became aware

1 of the water modeling happening related to Camp
2 Lejeune?

3 A After I was contacted about the case.

4 Q So when this -- or strike that.

5 When the water modeling was happening in
6 the early 2000s, you were unaware of it.

7 Is that fair?

8 A Correct.

9 Q Have you read the ATSDR reports on water
10 modeling done at Camp Lejeune?

11 A Yes. Well, yes. There are many, many,
12 many reports. And I've read many of them. The
13 ones focused on -- yes.

14 Q Which -- to the best of your memory,
15 which ones have you read or what was the subject
16 matter of the reports that you've read?

17 MS. BAUGHMAN: Objection. Object to the
18 form.

19 THE WITNESS: Certainly read the summary
20 reports for both, in detail. And then some of
21 the other supporting ones. I'd have to look back
22 to remember.

23 Q (BY MS. HORAN) And would all of the
24 reports that you've read relating to the ATSDR
25 water modeling be on your updated materials

1 considered list?

2 A Yes.

3 Q I'm happy to have you look at that list.
4 It should be next to you.

5 A This list? (Indicating)

6 Q Yes. So that's Exhibit 3 that you have
7 in front of you now. So could you identify which
8 of the ATSDR reports you've read in detail?

9 MS. BAUGHMAN: So those are listed
10 throughout the documents. You'll have to go page
11 by page and just look at -- because they're not
12 separated by these are the ATSDR. So it's listed
13 by the -- the first author.

14 THE WITNESS: So you're asking me just
15 to look through the list and try and recall.

16 Q (BY MS. HORAN) Sure. Exactly.

17 MS. BAUGHMAN: The question is, if he's
18 read them or reviewed them?

19 MS. HORAN: Uh-huh.

20 MS. BAUGHMAN: Okay.

21 MS. HORAN: The question is whether --

22 Q (BY MS. HORAN) Which ATSDR reports,
23 sitting here today, do you recall reading in
24 detail?

25 MS. BAUGHMAN: In detail. Okay. Object

1 to the form.

2 THE WITNESS: There's so many of them
3 it's hard to remember which specific ones.

4 Q (BY MS. HORAN) Just what you can
5 remember, Dr. Sabatini.

6 MS. BAUGHMAN: Take your time.

7 THE WITNESS: Okay. On Page 2. I'm
8 really hard-pressed to remember just specifics,
9 but I do remember several.

10 Q (BY MS. HORAN) Well, perhaps --

11 MS. BAUGHMAN: Wait. Were you finished
12 answering?

13 THE WITNESS: Yes. I'm -- I might be
14 able to identify the few specifically, but I'm
15 not sure I'll be able to identify all that I've
16 reviewed.

17 Q (BY MS. HORAN) Sure. If you could
18 identify the few specifically, that would be
19 great.

20 A Okay. I remember the Faye, et. al.
21 Faye on Page 2.

22 Q All of those?

23 A No, no. I'm...

24 Q Okay.

25 A As I recall, the best of my recollection

1 -- I don't want to speculate. I think F and C.
2 2007. 2008. Really I think it's the...

3 Specifically, ATSDR you asked?

4 Q Uh-huh.

5 A I guess the -- Page 4. There may have
6 been others that I'm missing. Page 4, Maslia
7 2005 Expert Peer -- Peer Review Panel. Maslia
8 2009 Expert Panel. Maslia Chapter A, 2007.

9 Maybe Chapter I. 2013. Chapter A.

10 So those -- just to highlight some.

11 Q Sure.

12 A Some of the ones.

13 And some I looked at in lesser details.
14 Those would be the ones I recall looking at in
15 detail.

16 Q Sure.

17 And you mentioned also looking in detail
18 of the summaries of both Hadnot Point and Tarawa
19 Terrace?

20 A I think those were the As.

21 Q Sure.

22 A As I recall.

23 Q You can set that aside.

24 A (Witness complies.)

25 Q But again, if you ever need it during

1 the deposition, feel free to take a look at it.

2 A Okay. Thank you.

3 Q Other than your opinion that the ATSDR
4 model indirectly accounts for VOC losses during
5 the water treatment storage and distribution, you
6 are not offering opinions on the ability of ATSDR
7 water model to determine historic contaminant
8 exposure levels in the water supply for
9 individuals; correct?

10 MS. BAUGHMAN: Object to the form.

11 THE WITNESS: There's a lot to that
12 statement. Could you repeat that?

13 Q (BY MS. HORAN) Sure.

14 Other than your opinion that the ATSDR
15 model indirectly accounts for VOC losses, you're
16 not offering any opinions on the ability of
17 ATSDR's water model to determine historic
18 contaminant exposure levels in the water supply
19 for individuals who lived at Camp Lejeune.

20 MS. BAUGHMAN: Objection to form.

21 THE WITNESS: I'm not sure if my second
22 opinion which says that they did use treated
23 water to calibrate their model may fall in to
24 what you're saying.

25 Q (BY MS. HORAN) Sure.

1 So other than that opinion --

2 A Other than my three opinions.

3 Q Sure. And only your second opinion
4 relates to the ATSDR model. Is that fair?

5 MS. BAUGHMAN: Objection to form.

6 THE WITNESS: To the extent that it
7 demonstrates that treated water samples were used
8 in the -- in the analysis.

9 Q (BY MS. HORAN) Sure.

10 A Correct.

11 Q Your opinion 1 does not reference the
12 ATSDR water modeling; correct?

13 A No.

14 Q And your opinion 3 does not reference
15 the ATSDR modeling; correct?

16 A Correct.

17 Q So other than your second opinion which
18 references the ATSDR model, you're not offering
19 any other opinions on the ability of ATSDR's
20 water model to determine historic contaminant
21 exposure levels in the water supply for
22 individuals who lived or worked at Camp Lejeune.
23 Is that fair?

24 MS. BAUGHMAN: Objection to form.

25 THE WITNESS: Excluding the impact this

1 might have had, no. I agree.

2 Q (BY MS. HORAN) We've been going about
3 an hour. Would you like to take a short break?

4 MS. BAUGHMAN: Just if you need it. If
5 you're good to go, we can keep going.

6 THE WITNESS: We can go a little bit
7 longer.

8 Q (BY MS. HORAN) Okay. And I don't
9 remember if I said this at the beginning, but if
10 I didn't, if you ever need a break, happy to take
11 it whenever you would like it.

12 A Thank you.

13 Q I just ask that if the question is
14 pending, you just answer the question and then
15 we'll take the break.

16 A Sounds good.

17 Q Okay. You've read the expert report of
18 Dr. Alex Spiliotopoulos; correct?

19 A I glanced at it.

20 Q And you haven't offered any opinions in
21 your report commenting on Dr. Spiliotopoulos --

22 A Oh, his report. I'm sorry.

23 (Simultaneous crosstalk)

24 THE REPORTER: Wait. Any opinions in
25 your report.

1 MS. HORAN: Commenting on Dr.
2 Spiliotopoulos's opinions.

3 THE WITNESS: And I -- I should restate
4 what I said. I was -- when you asked the
5 question, I was thinking his deposition.

6 No, I did read his report fully.

7 Q (BY MS. HORAN) And you haven't offered
8 any opinions in your report commenting on Dr.
9 Spiliotopoulos's opinions in his report; correct?

10 A Correct.

11 Q You can -- if you can open your report
12 again which is Exhibit 2. And turn to Page 2.

13 A (Witness complies.)

14 Q The second paragraph says, to start, "My
15 methodology for assessing Dr. Hennes's expert
16 report opinions 2, 10, and 13..."

17 Do you see that?

18 A Yes.

19 Q So you've only assessed Dr. Hennes's
20 opinions 2, 10, and 13?

21 A Correct.

22 Q You did not assess Dr. Hennes's other
23 opinions; correct?

24 A Correct.

25 Q And you agree with Dr. Hennes that there

1 would be VOC losses during the storage
2 distribution -- strike that.

3 You agree with Dr. Hennet that there
4 would be VOC losses during the storage treatment
5 and distribution of water at Camp Lejeune;
6 correct?

7 MS. BAUGHMAN: Objection to form.

8 THE WITNESS: I agree that there was a
9 potential for losses.

10 Q (BY MS. HORAN) And your disagreement
11 with Dr. Hennet is in the amount of VOC losses at
12 the water treatment plants and its reservoirs.

13 Is that fair?

14 MS. BAUGHMAN: Objection to form.

15 THE WITNESS: In -- yes.

16 Q (BY MS. HORAN) And you agree with Dr.
17 Hennet that there would be VOC losses through the
18 use of water buffaloes.

19 Is that fair?

20 MS. BAUGHMAN: Objection to form.

21 THE WITNESS: The potential for losses.
22 Yes.

23 Q (BY MS. HORAN) You said, "The potential
24 for losses." What do you mean by that?

25 A The -- the potential is there. It's a

1 question of the magnitude of the losses.

2 Q Sure.

3 So there would be losses. And your
4 disagreement with Dr. Hennet is in how much of
5 the losses.

6 A The degree --

7 MS. BAUGHMAN: Objection to form.

8 THE WITNESS: Yeah. The degree.

9 Q (BY MS. HORAN) And as to water
10 buffaloes, your disagreement with Dr. Hennet
11 again is in the amount of losses through the
12 filling and use of the water buffaloes.

13 Fair?

14 MS. BAUGHMAN: Objection to form.

15 THE WITNESS: Correct.

16 Q (BY MS. HORAN) Throughout today, if I
17 refer to VOCs or contaminants of concern, then
18 I'm referring, collectively, to PCE, TCE,
19 Benzene, 1,2-DCE, and BC .

20 Do you understand that?

21 A Yes.

22 Q And if I'm referring to one of those
23 contaminants of concern, then I'll call it by
24 name.

25 Does that work for you?

1 A You'll refer to it as...

2 Q If I'm referring to one of those
3 contaminants, I'll just use its name.

4 Is that fair?

5 A Sounds good.

6 (Government Exhibit 4 marked for identification)

7 Q (BY MS. HORAN) I'm marking as Exhibit 4
8 -- this is a document with a Bates
9 CL_PLG-expert_Sabatini_0000002424.

10 Dr. Sabatini, have you seen these
11 before?

12 A Yes.

13 Q And what are they?

14 A They are my notes.

15 Q And what are they your notes from?

16 A Notes from my conversation with Chris
17 Mattingly.

18 Q And who is Chris Mattingly?

19 A Chris Mattingly is the director of water
20 utilities for the City of Norman and formerly
21 operated the Norman Water Treatment Plant.

22 Q Is Mr. Mattingly retired?

23 A Say again.

24 Q Is he retired?

25 A No.

1 Q What is his role now?

2 A He's currently -- he's currently the
3 Norman director of water utilities.

4 Q And you met with Mr. Mattingly on
5 December 18, 2024. Is that fair?

6 A Correct.

7 Q And did you write these notes in your
8 meeting with Mr. Mattingly or did you get home
9 and write them later in time?

10 A Sometimes, I take notes, and then to
11 make them more presentable, I rewrite them.

12 Q Is that what you did with these?

13 A I don't -- I don't recall. Likely.

14 Q Did you meet with Mr. Mattingly in
15 person or was it via the phone?

16 A It was on the phone.

17 Q And why -- or strike that.

18 Did -- did you reach out to Mr.
19 Mattingly to talk to him?

20 A Yes.

21 Q And why -- what was the purpose of your
22 reaching out to Mr. Mattingly?

23 A The main purpose was because of the
24 recarbonation basin operation.

25 Q And what did you want to ask Mr.

1 Mattingly about the recarbonation basin?

2 A Relative to the operation of a
3 recarbonation basin, the CO2 injection into the
4 recarbonation basin.

5 Q So did you want to know how much CO2 was
6 injected or what -- what was your -- finding out
7 how it worked? What was your goal?

8 A Hennet -- Hennet had suggested that
9 there be significant losses during recarbonation,
10 and as I recall, he used the analogy of air
11 stripping. And I knew that air stripping has a
12 very high air-to-water ratio to promote air
13 stripping where as I know in recarbonation basin,
14 you're trying to dissolve all the carbon dioxide
15 into the water.

16 So I wanted to get a handle on kind of
17 that carbon dioxide-to-water ratio versus an
18 air-to-water ration in an air stripper.

19 Q And is that -- the fifth bullet you
20 have --

21 A Right.

22 Q -- on this list is about the
23 recarbonation basin.

24 A Correct.

25 Q Is that the notes you have in reference

1 to your questions about recarbonation basin?

2 A That was helpful information he
3 provided.

4 Q Have you ever seen a recarbonation
5 basin --

6 A Oh, yes.

7 Q -- basin at a water treatment plant?

8 A Yes. Many.

9 Q And where was that?

10 A Oh. Of the 30 some water treatment
11 plants I visited on many -- well, Norman, for
12 sure. I'd have to go back through my memory bank
13 to remember the other ones. But it's a common
14 process. You add --

15 MS. BAUGHMAN: Just -- just she asked
16 where.

17 THE WITNESS: Yeah. Yeah. It's a
18 common process.

19 Q (BY MS. HORAN) You said you've been to
20 roughly 30 water treatment plants?

21 A Around that. I -- yes.

22 Q Was that in your capacity as a professor
23 at the University of Oklahoma in your
24 professional --

25 A Yes.

1 Q Other than to talk about the
2 recarbonation basin, did you have any other
3 purpose in talking to Mr. Mattingly?

4 A Yes.

5 Q And what were those?

6 A General operating conditions for basins
7 at the treatment plant. But that was not guiding
8 me so much for Camp Lejeune. That was just more
9 general background information.

10 Q And what, to the best of your memory,
11 did you ask him?

12 A I asked about operation of the raw
13 water, clear well, and water tower basins.

14 Q And what did he tell you?

15 A Just what's on the document.

16 Q And that's bullet number 2 on your
17 notes?

18 A Yes.

19 Q And that reads "Asked about water" --
20 strike that.

21 The notes -- the second bullet reads,
22 "Asked about raw water, clear well, and water
23 towers-confirmed that they are all enclosed; not
24 open at the top with no forced air exchange."

25 Did I read that correctly?

1 A Correct.

2 Q What did you mean when you wrote "no
3 forced air exchange"?

4 A They were vented, but there was not
5 forced air going through the -- the vessels.

6 Q And when you say "forced air", you mean
7 there was no fan or something like that?

8 A Correct.

9 Q But you did understand that they were
10 vented.

11 A Yes.

12 Q What made you believe that the
13 information you received from Mr. Mattingly would
14 be applicable to Camp Lejeune?

15 A To get a handle on the recarbonation
16 basin as a contrast to Hennet's suggestion that
17 it was analogous to an air stripper.

18 Q And why did you believe that what Chris
19 Mattingly had to say about a recarbonation would
20 be applicable to that at Camp Lejeune?

21 A I didn't expect it would be directly
22 applicable, but I expected it to be order of
23 magnitude that it would -- where as an air
24 stripper has a very high air-to-water ratio, this
25 was much lower CO2-to-water ratio.

1 Q And the water ratio that Mr. Mattingly
2 told you about was 1 to 20 or less?

3 A Right.

4 Q Do you know if Mr. Mattingly has ever
5 been to Camp Lejeune?

6 A No. Not to my knowledge.

7 Q Going back to your second bullet, why
8 did you ask Chris Mattingly about whether the
9 water towers were enclosed?

10 A Just curious. To confirm my
11 understanding.

12 Q Your second bullet, going back to the no
13 forced air exchange, you would agree that a lack
14 of forced air exchange is consistent with tanks
15 with regular changes in water levels?

16 MS. BAUGHMAN: Object to the form.

17 THE WITNESS: Say that again.

18 Q (BY MS. HORAN) Sure.

19 You would agree that a lack of forced
20 air exchange is consistent with tanks with
21 regular changes in water levels?

22 MS. BAUGHMAN: Object to the form.

23 THE WITNESS: Ventilation allows the
24 water level to go up and down without changing
25 the pressure in the system.

1 Q (BY MS. HORAN) And you agree that
2 vented tanks with regular change in water levels
3 will experience air exchange without force?

4 MS. BAUGHMAN: Object to the form.

5 THE WITNESS: To a degree.

6 Q (BY MS. HORAN) What do you mean when
7 you say "to a degree"?

8 A The -- there would be -- as the water
9 level goes down, the air would enter to replace.
10 As the water level goes up, the air would escape.
11 But that's not complete exchange of the air.

12 Q You would agree that a lack of forced
13 air exchange is consistent with a vented tank;
14 correct?

15 MS. BAUGHMAN: Object to the form.

16 THE WITNESS: Say that again.

17 Q (BY MS. HORAN) A lack of forced air
18 exchange is consistent with a vented tank.

19 MS. BAUGHMAN: Object to the form.

20 THE WITNESS: No, I would not.

21 Q (BY MS. HORAN) And why not?

22 A Repeat -- repeat it one more time.

23 Q Sure.

24 You would agree that a lack of forced
25 air exchange is consistent with a tank being

1 vented.

2 A No.

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: To me, forced air exchange
5 is what happens in an air stripper where you're
6 intentionally sweeping air through the system
7 continuously to encourage vent -- the
8 volatilization. And that's not what's happening
9 when the water level goes up and down in a tank
10 with venting.

11 Q (BY MS. HORAN) But you would agree that
12 if a tank does not have forced air exchange, the
13 air -- as the water levels go up and down, there
14 has to be a way for the air to escape via --

15 A Yes.

16 Q -- a vent.

17 So you would agree that structurally, if
18 there's no forced air exchange, then it would be
19 consistent that the tank would have a vent.

20 MS. BAUGHMAN: Object to the form

21 Q (BY MS. HORAN) Is that fair?

22 THE WITNESS: No, I would not.

23 Forced air, to me, is you're -- you have
24 some kind of a fan or pump or something that's
25 forcing the air. When the water level goes up

1 and down, that's just natural; that's not forced.
2 I would not agree with the terminology "forced
3 air exchange" to what happens as the water level
4 goes up and down in a reservoir.

5 Q (BY MS. HORAN) Sure.

6 And when you have a reservoir where the
7 water's going to go up and down in level, the air
8 has to escape somehow.

9 A Correct.

10 Q And the way for it to escape would be
11 through a vent.

12 Fair?

13 A Last part again.

14 Q The way for the water -- or strike that.

15 The way for the air to escape as the
16 water levels are rising and dropping throughout
17 time would be through a vent.

18 A Correct. But that's natural. That's
19 not forced. It happens naturally as the water
20 level goes up and down. There's no energy put
21 into the system to force that to happen.

22 Q And the water -- strike that.

23 And the air going through the vent as
24 the water level rises and drops is also natural.

25 A That's what I'm saying.

1 MS. BAUGHMAN: Object to the form.

2 Yeah.

3 THE REPORTER: I'm sorry. Repeat.

4 That's what I'm...

5 THE WITNESS: That's what I am saying

6 is, that's a natural. That's not a forced.

7 Q (BY MS. HORAN) Sure.

8 I think I might have already asked you
9 this, but I can't remember. Have you been to
10 Camp Lejeune?

11 A No.

12 Q So you wrote your rebuttal report
13 without inspecting the Hadnot Point or Holcomb
14 Boulevard water treatment systems.

15 Fair?

16 A In -- correct.

17 Q And you wrote your report without
18 examining any of the reservoirs or water tanks at
19 Camp Lejeune?

20 A Any of the...

21 Q Reservoirs or water tanks at Camp
22 Lejeune.

23 A Correct.

24 Q And you've never inspected any of the
25 spiractors at Camp Lejeune?

1 A Correct.

2 Q Have you ever personally inspected a
3 water buffalo?

4 A No.

5 Q Have you ever seen a water buffalo in
6 person?

7 A I likely have on my visits to military
8 bases to do the remediation research.

9 Q As part of your work in this case, you
10 have not --

11 A No.

12 Q -- personally inspected a water buffalo?

13 MS. BAUGHMAN: Try to wait until she
14 finishes her whole question before you answer.

15 THE WITNESS: Thank you.

16 MS. BAUGHMAN: The court reporter has a
17 hard --

18 THE WITNESS: Sorry.

19 MS. BAUGHMAN: -- time. Okay.

20 Q (BY MS. HORAN) Do you have any memory
21 of ever observing the filling of a water buffalo
22 at any of the military bases where you may have
23 seen one?

24 A No.

25 Q Prior to submitting your rebuttal

1 report, had you ever taken any actions to visit
2 Camp Lejeune?

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: Say that again.

5 Q (BY MS. HORAN) Sure.

6 Prior to submitting your rebuttal
7 report, had you ever taken any actions or asked
8 to visit Camp Lejeune?

9 A No.

10 Q So you did not think it was important to
11 go to Camp Lejeune in order to offer your
12 opinions in your rebuttal report.

13 Fair?

14 MS. BAUGHMAN: Object to the form.

15 THE WITNESS: I had the information at
16 hand that I needed.

17 Q (BY MS. HORAN) Sitting here today, do
18 you want to visit Camp Lejeune?

19 A Say that again.

20 Q Sitting here today, do you want to visit
21 Camp Lejeune?

22 A Want to or need to?

23 Q We'll start with want and then we can go
24 to need.

25 A I always like to tour water treatment

1 plants. I don't need to.

2 Q You don't need to.

3 So there's no need for you to visit Camp
4 Lejeune for the opinions that you've offered in
5 this case?

6 MS. BAUGHMAN: Object to the form.

7 THE WITNESS: The only reason I would
8 want to is in response to Hennessey's visit in
9 February.

10 Q (BY MS. HORAN) And what about Dr.
11 Hennessey's visit in February would make you want to
12 go to Camp Lejeune?

13 A Because he was rebutting my rebuttal
14 through his visit. And so while I didn't need --
15 I had all the information I needed in the AH
16 documents to do my calculations. Given that he
17 went on a rebuttal to my rebuttal trip, it would
18 be nice to have the same opportunity.

19 Q And what information do you hope to gain
20 from that visit that you don't have today?

21 MS. BAUGHMAN: Object to the form.

22 THE WITNESS: We don't really know
23 exactly what Hennessey did and who he talked to and
24 what he saw. So it would be just to have that
25 same background information that he had.

1 Q (BY MS. HORAN) Did anything from that
2 Dr. -- or strike that.

3 You attended Dr. Hennet's deposition;
4 correct? And you've read it?

5 A Right. Correct.

6 Q And you've received the photos that Dr.
7 Hennet took at that visit; correct?

8 A Correct.

9 Q And you've reviewed the photos of his
10 measurements that he took at Camp Lejeune?

11 A Correct. To my knowledge. Correct.

12 Q And so if I'm -- what, for your
13 calculations information, would you seek to get
14 at Camp Lejeune if you were to visit?

15 MS. BAUGHMAN: Object to the form.

16 THE WITNESS: Say that again.

17 Q (BY MS. HORAN) What -- for your
18 calculations and opinions, what specific
19 information would you seek to get from the visit
20 at Camp Lejeune?

21 MS. BAUGHMAN: Object to the form.

22 THE WITNESS: My calculations were based
23 upon AH's extensive study and I felt that I had
24 all the information I needed. Nothing that I
25 have seen -- I -- I really don't know what Hennet

1 -- there wasn't report associated with his visit
2 so I don't know what all he did or what all it
3 meant. So I don't really anticipate -- I don't
4 see that there would be any changes -- I don't --
5 I'm confident in my calculations as they stand
6 today.

7 Q (BY MS. HORAN) Your water treatment
8 plant opinions are related to Hadnot Point and
9 Tarawa Terrace.

10 Fair?

11 A Say again.

12 Q Your water treatment plant opinions are
13 related to Hadnot Point and Tarawa Terrace.

14 Fair?

15 A Yes. Correct.

16 Q And you agree that the water going
17 through the water treatment plant at Holcomb
18 Boulevard was not contaminated with VOCs; right?

19 MS. BAUGHMAN: Object to the form.

20 During what timeframe?

21 MS. HORAN: Ever.

22 THE WITNESS: Yeah, it's --

23 Laura, I -- please stick to form and
24 foundation.

25 THE WITNESS: To the -- all the

1 information I've seen suggests that's true.
2 That's correct. Through the water treatment
3 plant.

4 Q (BY MS. HORAN) Yes. That was the
5 question.

6 A That's just different than the
7 distribution system.

8 Q Yes. The question was just related to
9 the water treatment plant.

10 A Just wanted to clarify that.

11 Q Yep.

12 And you agree that the wells that
13 supplied water to the water treatment plant at
14 Holcomb Boulevard were never determined to be
15 contaminated with VOCs.

16 MS. BAUGHMAN: Objection. Form and
17 foundation.

18 THE WITNESS: That's outside the scope
19 of my report.

20 Q (BY MS. HORAN) So you have no opinion
21 on that sitting here today?

22 A I'd have to review the documents to --
23 to make a statement on that.

24 Q I'm about to switch topics. Are you
25 still good or do you want to take a little break?

1 A We can go a little bit longer.

2 Q Okay.

3 Your report uses Coke bottles to show
4 how Henry's Law works.

5 Do you recall that?

6 A Yes. It's a common teaching method I
7 use when I talk about volatilization in air
8 stripping.

9 Q So you use the Coke analogy as a teacher
10 as well?

11 A Students 20 years later remember it.

12 Q And the general premise is that the Coke
13 and the head space in the Coke bottle reach an
14 equilibrium of carbon dioxide which is different
15 than that found outside the bottle because of the
16 bottle barrier between the inside of the bottle
17 and the outside of the bottle.

18 A Correct.

19 Q And if you leave the cap off the Coke,
20 the CO₂ will reach equilibrium with the ambient
21 air and go flat; correct?

22 A Correct.

23 Q And the reason that a flat Coke doesn't
24 fizz is that the ratio of concentration of carbon
25 dioxide left in the Coke to the concentration of

1 the carbon dioxide in the ambient air is equal to
2 Henry's constant for carbon dioxide.

3 Fair?

4 A That's -- that equilibrium is achieved.
5 Correct.

6 Q The cap of a Coke is similar to a vent
7 in that if you cut a vent into the side of the
8 bottle, it'll have the same effect as taking the
9 cap off.

10 MS. BAUGHMAN: Object to the form.

11 Q (BY MS. HORAN) Is that fair?

12 MS. BAUGHMAN: Object to the form.

13 THE WITNESS: Say that again.

14 Q (BY MS. HORAN) Sure.

15 If you cut a vent in the side of a Coke
16 bottle, it would have the same impact as taking
17 the cap off.

18 MS. BAUGHMAN: Object to the form.

19 THE WITNESS: I disagree.

20 Q (BY MS. HORAN) And why is that?

21 A Has to do with the area. So if you put
22 a small hole in the Coke bottle, that's different
23 than taking the cap off.

24 Q Sure.

25 But CO2 would still go through the small

1 hole or vent. Is that fair?

2 A To a lesser degree. Much lesser degree.

3 And part of the -- part of the breakdown
4 -- well, part of -- the pressure of the CO2 in
5 that head space is different from the VOC levels
6 in the area that we're talking about.

7 Q Even with a small hole in a Coke bottle,
8 over time, will it eventually reach equilibrium
9 with the ambient air outside the bottle?

10 A Over an extended time.

11 Q And most people have probably
12 experienced that before when they've picked up a
13 can of Coke and it was flat.

14 Fair?

15 MS. BAUGHMAN: Object to the form.

16 THE WITNESS: I guess there's that rare
17 occasion.

18 Q (BY MS. HORAN) How much time does it
19 take for a Coke with a vent -- or strike that.

20 How much time would it take for a Coke
21 with the cap off to equilibrate and go flat?

22 A I -- I couldn't say.

23 Q And I think I understand this, but your
24 opinion is that it would be a shorter amount of
25 time than if it was just a pinhole in the side of

1 the Coke bottle.

2 A Yes.

3 Q And if you had something in between a
4 pinhole and the whole cap off, that would fall
5 somewhere in between on the timeframe of how long
6 it would take to equilibrate.

7 MS. BAUGHMAN: Object to the form.

8 THE WITNESS: In general, I would agree.

9 Q (BY MS. HORAN) Another example you use
10 in your report is heat flow wherein heat flow is
11 lost from the home in proportion to the
12 temperature difference between the inside and
13 outside the home surface area and the insulation
14 in the home.

15 Do you remember that?

16 A Yes.

17 Q And the heat is lost due to diffusion?

18 A Yes.

19 Q And the water equivalent of this would
20 be a sealed bucket wherein the water is warmer
21 than the outside air?

22 MS. BAUGHMAN: Object to the form.

23 THE WITNESS: Say that again.

24 Q (BY MS. HORAN) The water equivalent to
25 the home example you have in your report would be

1 a sealed bucket wherein the water is warmer than
2 the outside air.

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: In general. Yes.

5 Q (BY MS. HORAN) Would you agree that in
6 a sealed bucket wherein the water is warmer than
7 the outside air, if the water was being mixed in
8 the bucket, then the heat loss is not fully
9 diffusion controlled?

10 MS. BAUGHMAN: Object to the form.

11 THE WITNESS: Say that again.

12 Q (BY MS. HORAN) Sure.

13 Would you agree that in a sealed bucket
14 wherein the water is warmer than the outside air,
15 if the water is being mixed in the bucket, then
16 the heat loss is not fully diffusion controlled?

17 MS. BAUGHMAN: Object to the form.

18 THE WITNESS: This is all very
19 speculative. Depends upon lots of factors.

20 Q (BY MS. HORAN) What are the factors?

21 A I'd need to know more about the
22 situation you're describing.

23 Q What would you need to know?

24 A Well, explain to me further the bucket.
25 Is it full of water? Is it water and air? Is --

1 I need to know more details.

2 Q So you would need to know the amount of
3 water in the bucket?

4 A The amount and the -- I'd just need to
5 know the whole system. I'd have to have a
6 schematic of volume of water, volume of air, what
7 kind of mixing, et cetera.

8 Q So if it's a -- if everything is
9 controlled -- so it has the same amount of water
10 in it and the only difference is that it's being
11 mixed, would you then agree that the heat loss is
12 not fully diffusion controlled?

13 MS. BAUGHMAN: Object to the form.

14 THE WITNESS: Ultimately, it's
15 diffusion. Mixing -- well, ultimately, it's
16 diffusion.

17 Q (BY MS. HORAN) Is there anything --
18 agree that it would be faster when mixing?

19 MS. BAUGHMAN: Object to the form.

20 THE WITNESS: Say again.

21 Q (BY MS. HORAN) Would you agree that the
22 diffusion would be faster when the water is being
23 mixed?

24 A I wouldn't agree that diffusion would be
25 faster. Diffusion's a molecular property.

1 Q Do you agree that the loss of heat would
2 be faster when the water is being mixed?

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: It all -- it's all
5 speculative. I can envision cases where it would
6 be and maybe other cases where -- I mean if it's
7 uniform temperature throughout, then mixing would
8 have little limited impact.

9 Q (BY MS. HORAN) And when you say
10 "uniform throughout", are you talking about the
11 water in the bucket or are you talking about the
12 temperature outside?

13 A Water in the bucket. Well, both
14 actually.

15 Q Okay. So you do not agree that if the
16 water in the bucket's being mixed, then the heat
17 loss would be faster than if the water was
18 stationary.

19 MS. BAUGHMAN: Object to the form.

20 THE WITNESS: I'd have to know the
21 situation again. But diffusion is -- would be
22 independent -- the diffusion process itself would
23 be independent of the mixing.

24 Q (BY MS. HORAN) The rate of
25 diffusion-controlled volatilization losses for

1 immobile water body does not apply to flowing
2 mixing water; correct?

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: Say that again.

5 Q (BY MS. HORAN) The rate of
6 diffusion-controlled volatilization losses for
7 immobile water body does not apply to flowing or
8 mixing water; correct?

9 MS. BAUGHMAN: Object to the form.

10 THE WITNESS: One more time.

11 Q (BY MS. HORAN) The rate of
12 diffusion-controlled volatilization losses for
13 immobile water body --

14 A Immobile...

15 Q An immobile water body does not apply to
16 flowing or mixing water; correct?

17 MS. BAUGHMAN: Object to the form.

18 THE WITNESS: For an im- -- I'm trying
19 to parse the nuances of the question. For --

20 MS. BAUGHMAN: I'm going to object to
21 the form.

22 THE WITNESS: One more time.

23 MS. BAUGHMAN: If you don't understand,
24 you can tell her that.

25 THE WITNESS: Yeah. It's -- well,

1 there's nuances in the question.

2 Q (BY MS. HORAN) What are the nuances in
3 the question that are --

4 A Clarify -- read it one more time.

5 Q Sure.

6 The rate of diffusion-controlled
7 volatilization losses for immobile water body
8 does not apply to flowing mixing water; correct?

9 A Immobile water body --

10 Q Uh-huh.

11 MS. BAUGHMAN: Mobile or immobile?

12 Q (BY MS. HORAN) Immobile.

13 A Im- -- okay. Immobile.

14 I'd have to disagree.

15 Q So it's your opinion that the rate of
16 diffusion-controlled volatilization losses would
17 be the same for both immobile water bodies and
18 flowing or mixing water.

19 MS. BAUGHMAN: Object to the form.

20 THE WITNESS: Same two-film transfer
21 concept applies in both cases. There are --
22 there are other nuances.

23 Q (BY MS. HORAN) And the rate would be
24 the same for both immobile water bodies and
25 flowing mixing water?

1 MS. BAUGHMAN: Object to the form.

2 THE WITNESS: What do you mean by
3 "rate"?

4 Q (BY MS. HORAN) The rate of
5 diffusion-controlled volatilization losses would
6 be the same for both immobile water bodies and
7 flowing, mixing water.

8 Is that your opinion?

9 MS. BAUGHMAN: Same objection.

10 THE WITNESS: That's a very broad
11 question. It all comes down to interfacial area
12 and so that's what it's a function of. So I
13 mean, if you're talking about a lake versus a
14 stream -- is that what you're getting at?

15 Q (BY MS. HORAN) I'm just asking about
16 the -- the baseline principle.

17 MS. BAUGHMAN: Object to the form.

18 THE WITNESS: I'd have to have more
19 details to answer the question.

20 Q (BY MS. HORAN) If the water mixes,
21 would it increase the facial area?

22 MS. BAUGHMAN: Object to the form.

23 THE WITNESS: Depends upon what you mean
24 by mixing. If it's splashing, then that could
25 have an increase on the area. It depends.

1 Q (BY MS. HORAN) What if there -- or
2 strike that.

3 You describe a two-film mass transfer
4 process in your report on Page 5. This is
5 Exhibit 2.

6 Do you see what you've marked as
7 equation 3-3?

8 A Yes.

9 Q Would this equation 3-3 apply to the
10 rate of volatilization losses for a body of water
11 with mixing?

12 A Yes.

13 Q Would it, in your opinion, accurately
14 predict, or over predict, or under predict the
15 rate of volatilization losses for a body of water
16 with mixing?

17 MS. BAUGHMAN: Object to the form.

18 THE WITNESS: If you quantify all the
19 parameters correctly, it would be accurate.

20 Q (BY MS. HORAN) If you had a bucket of
21 water with TCE dissolved into it and you didn't
22 mix it, is it your opinion that the losses would
23 be diffusion controlled?

24 MS. BAUGHMAN: Object to the form.

25 THE WITNESS: Bucket of water with TCE

1 in it.

2 Q (BY MS. HORAN) Uh-huh. But you're not
3 mixing it.

4 A No mixing. Well, it would be diffusion
5 and film transfer.

6 Q Diffusion and film transfer would be the
7 two processes that would control the losses?

8 A Correct.

9 Q And assuming you have a spinning
10 propeller in the bottom of that, that mix the
11 water around, would volatilization be increased?

12 A Would it be...

13 Q Increased.

14 MS. BAUGHMAN: Object to the form.

15 THE WITNESS: It could be.

16 Q (BY MS. HORAN) And when you say it
17 could be, what would be the factors that would
18 increase it?

19 A If the mixing keeps the concentration
20 more uniform throughout the system, then it would
21 help reduce diffusion limitations.

22 Q Anything else?

23 A (Shakes head.)

24 Q Do you know how much water enters the
25 reservoir at Camp Lejeune per day?

1 MS. BAUGHMAN: Object to the form.

2 THE WITNESS: It's in the report.

3 Q (BY MS. HORAN) Oh. Where was that?

4 A How much water enters the...

5 Q Reservoir at Camp Lejeune per day.

6 MS. BAUGHMAN: Object to the form.

7 THE WITNESS: Yeah. That's all
8 documented in the AH -- the water treatment. And
9 they have the -- that's information that's in the
10 report.

11 Q In your expert report --

12 A No.

13 Q -- or in the AH Environmental?

14 A AH Environmental.

15 Q Okay. And you relied upon what AH
16 Environmental put in their report about that?

17 A Correct.

18 Q And is it your understanding that AH
19 Environmental also says how much water exits the
20 reservoir at Camp Lejeune per day?

21 A Say again. That...

22 Q That the AH Environmental report also
23 says how much water exits the reservoir at Camp
24 Lejeune per day.

25 MS. BAUGHMAN: Objection to form.

1 THE WITNESS: Specifically, that's --
2 what goes in comes out.

3 Q (BY MS. HORAN) Can you describe the
4 process for how water moves through the Camp
5 Lejeune water treatment plant?

6 MS. BAUGHMAN: Object to the form.

7 THE WITNESS: Described in the
8 schematics.

9 Q (BY MS. HORAN) Which schematic are you
10 referencing?

11 A For example, 3-1 in my report. Page 3.

12 Q So you agree that the water goes through
13 the raw water reservoir, into the spiractors,
14 into the recarbonation basin, through the gravity
15 filters, and then into the finished water
16 reservoir?

17 MS. BAUGHMAN: Object to the form.

18 THE WITNESS: Correct.

19 Q (BY MS. HORAN) And that's for the
20 Hadnot Point --

21 A Right.

22 Q -- water treatment plant; correct?

23 A And the next figure's for -- and these
24 are just from -- well, from AH. And I believe
25 Hennet had these in his as well.

1 Q Do you agree that the reservoir mixes
2 water?

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: Say again.

5 Q (BY MS. HORAN) The reservoir mixes
6 water.

7 MS. BAUGHMAN: Object to the form.

8 THE WITNESS: No.

9 Q (BY MS. HORAN) And what's your basis
10 for not agreeing that the reservoir mixes water?

11 MS. BAUGHMAN: Object to the form.

12 THE WITNESS: Well, when you say "mixes
13 water," I mean, in a water treatment plant,
14 mixing has a propeller that man- -- forcefully
15 mixes the water.

16 Q (BY MS. HORAN) And it's your
17 understanding that Camp Lejeune does not
18 forcefully mix water in the reservoirs?

19 A That's my understanding.

20 Q And you would agree that there are VOC
21 losses at the spiractors at Camp Lejeune;
22 correct?

23 MS. BAUGHMAN: Object to the form.

24 THE WITNESS: Calculations indicate as
25 much.

1 Q (BY MS. HORAN) And you would agree that
2 there are VOC losses at the sand filters at Camp
3 Lejeune?

4 MS. BAUGHMAN: Object to the form.

5 THE WITNESS: I'm sorry. At the...

6 Q (BY MS. HORAN) The sand filters.

7 MS. BAUGHMAN: Object to the form.

8 THE WITNESS: I deem that to be
9 negligible, as did Hennet.

10 Q (BY MS. HORAN) So yes, but a small
11 amount? Or --

12 MS. BAUGHMAN: Object to the form.

13 Q (BY MS. HORAN) -- what do you mean when
14 you say "negligible"?

15 A As possibility, but it's very minor.
16 Negligible.

17 Q Would you agree that there are VOCs lost
18 in the treated water reservoirs?

19 MS. BAUGHMAN: Object to the form.

20 THE WITNESS: Possibility, but likely
21 very minor.

22 Q (BY MS. HORAN) Would you agree that
23 there are VOC losses in the water towers?

24 MS. BAUGHMAN: Object to the form.

25 THE WITNESS: Possibly, but very minor.

1 Q (BY MS. HORAN) And when you say
2 "possibly," what -- what do you mean?

3 A Any -- it's certainly possible that
4 there might be some minor losses.

5 Q Would you mind if we take a break at
6 this point?

7 A Sure.

8 Q Thank you.

9 THE VIDEOGRAPHER: We're off the record
10 at 10:47 a.m.

11 (Short break from 10:47 a.m. to 11:00 a.m.)

12 THE VIDEOGRAPHER: We're back on the
13 record at 11:00 a.m.

14 Q (BY MS. HORAN) Welcome back, Dr.
15 Sabatini.

16 A Thank you.

17 Q You understand you're still under oath?
18 You're still under oath.

19 A Thank you. Yes. Understood.

20 Q Right before the break --

21 A And is now a good time to --

22 MS. BAUGHMAN: No. You -- no. Just
23 answer her questions.

24 THE WITNESS: Okay.

25 Q (BY MS. HORAN) Right before the break,

1 you said -- or I think I understood. I had asked
2 you if you would agree that the reservoir mixes
3 water, and you had referenced a mechanical
4 mixing.

5 Do you recall that?

6 A When you -- when you -- yes, I do.

7 Q Okay. The water reservoirs at Camp
8 Lejeune, setting aside mechanical mixing, would
9 organically mix; correct?

10 MS. BAUGHMAN: Object to the form.

11 THE WITNESS: Depends upon what you mean
12 by "organically mix."

13 Q (BY MS. HORAN) Sure.

14 So as water is drawn into the reservoir,
15 it will -- the flow rates and the -- or the
16 changes in flow rates in the diffusion will move
17 the water around in the reservoir; correct?

18 MS. BAUGHMAN: Object to the form.

19 THE WITNESS: To a certain degree.

20 Q (BY MS. HORAN) And when water is pulled
21 out of the raw water reservoirs, or any of
22 reservoirs, it will again mix the water in the
23 reservoir; correct?

24 MS. BAUGHMAN: Object to the form.

25 THE WITNESS: To a very limited degree.

1 Q (BY MS. HORAN) And why would that be
2 limited?

3 A Because when we talk about reactor
4 design, there's a well-mix system where you have
5 widespread mixing. What you're describing would
6 be more minor, localized mixing.

7 Q Would it mix throughout the entire water
8 reservoir? Or when you say limited local, what
9 did you mean?

10 MS. BAUGHMAN: Object to the form.

11 THE WITNESS: My vision would be if the
12 water enters, there might be a little bit of
13 mixing right there. But that wouldn't
14 necessarily mix throughout the basin. It would
15 be localized to the inlet.

16 Q (BY MS. HORAN) And is the same -- your
17 understanding or opinion the same for where water
18 is drawn out of the reservoir?

19 MS. BAUGHMAN: Object to the form.

20 THE WITNESS: To a lesser degree even.
21 That would be less even than at the inlet.
22 Typically, it's flowing out by gravity.

23 Q (BY MS. HORAN) And as that gravity
24 pulls the water out, would it mix around the
25 reservoir?

1 MS. BAUGHMAN: Object to the form.

2 THE WITNESS: To a much lesser degree.

3 Q (BY MS. HORAN) Other than the expert
4 reports produced in this case and the AH
5 Environmental report, do you recall relying on
6 any other sources to learn about the structure of
7 the water treatment plants at Tarawa Terrace or
8 Hadnot Point?

9 MS. BAUGHMAN: Object to the form.

10 THE WITNESS: And you mentioned -- the
11 two you mentioned were...

12 Q (BY MS. HORAN) Other expert reports or
13 the AH Environmental report.

14 MS. BAUGHMAN: Object to the form.

15 THE WITNESS: There were some CLWs that
16 provided some information.

17 Q (BY MS. HORAN) And what -- could you
18 describe what those documents either were or what
19 information was contained in them, to the best of
20 your recollection?

21 MS. BAUGHMAN: Object to the form.

22 THE WITNESS: Oh, I'd have to go back
23 and review my notes. But well, some of it, I
24 guess, is in my report in terms of the
25 concentrations, pre-treatment and post-treatment

1 plant. Some of that was from the CLW. There was
2 information on water level variations in a
3 reservoir that was a CLW.

4 Q (BY MS. HORAN) So prior to submitting
5 your expert report, it was your understanding
6 that the water levels in the water reservoirs
7 would fluctuate?

8 A Yes.

9 MS. BAUGHMAN: Object to the form.

10 THE WITNESS: Yes, I recognize there
11 would be some up and down.

12 Q (BY MS. HORAN) Do you recall if you
13 ever looked at any building schematics for the
14 water treatment plants?

15 A Building schematics meaning?

16 Q You're an engineer so I think I'll defer
17 to you on what you would consider a --

18 A Well, I --

19 Q -- building schematic.

20 A Well, I looked at some schematics for
21 unit processes in the -- in the treatment system.
22 I didn't look at schematics for the fit building
23 that the processes were in.

24 Q Do you recall looking at any design
25 plans?

1 A In -- in -- in general, I do. Yes. I
2 think even in -- seems like there's one
3 description of updating the plant.

4 Q Other than updating the plant, do you
5 recall viewing any other design plans for the
6 water treatment plants --

7 MS. BAUGHMAN: Object to the form.

8 Q (BY MS. HORAN) -- at Camp Lejeune?

9 A I'd have to go back and look through my
10 notes.

11 Q Could you turn to Page 3 of your report
12 which is Exhibit 2?

13 A (Witness complies.)

14 Q Figure 3-1 we already talked about, but
15 that's the Hadnot Point water treatment plant
16 schematic.

17 A Yes.

18 Q In the paragraph above, you say, "Not
19 shown in Figure 3-1 is the 300,000 gallon water
20 tower filled from the finished water reservoir."

21 Do you see that?

22 A Yes.

23 Q And what source did you rely upon in
24 reaching the conclusion that there was only one
25 water tower at Hadnot Point?

1 MS. BAUGHMAN: Object to the form.

2 THE WITNESS: The AH Environmental.

3 Q (BY MS. HORAN) Sitting here, anything
4 besides the AH Environmental?

5 A Say again.

6 Q Sitting here today, do you recall
7 relying on anything other than the AH --

8 A No.

9 Q -- Environmental for that proposition?

10 A No.

11 Q Okay. When you reviewed Dr. Hennet's
12 report, did you review the underlying documents
13 that he relied upon as well?

14 MS. BAUGHMAN: Object to the form.

15 THE WITNESS: There were -- yes. Well,
16 I specifically remember several documents.

17 (Government Exhibit 5 marked for identification)

18 MS. HORAN: I'm handing to the witness a
19 document that I'll mark as Government Exhibit 5,
20 and it's Bates number
21 CLJA_watermodeling_07-0000003171, and it runs
22 through the Bates ending in 3184.

23 Q (BY MS. HORAN) Dr. Sabatini, I'll give
24 you a minute to -- to page through it. But have
25 you seen this document before?

1 A Parts of it look familiar. Parts of it
2 look familiar.

3 Q You see the first page, the Bates ending
4 in 171, says, "Hadnot Point Building Number 20 --

5 A Yes.

6 Q -- capacity 5MGD. With 40 deep wells
7 lime softening plant."

8 Do you see that?

9 A Yes.

10 Q Do you have any reason to doubt that
11 this is an accurate schematic of the Hadnot Point
12 Water Treatment Plant?

13 MS. BAUGHMAN: Objection. Form and
14 foundation.

15 THE WITNESS: I have no idea where this
16 came from. So I'm -- it's hard for me to comment
17 on -- on -- ask the question again.

18 Q (BY MS. HORAN) Sure.

19 I was just wondering if you had any
20 reason to doubt its accuracy having looked at it.

21 MS. BAUGHMAN: Objection. Form and
22 foundation.

23 THE WITNESS: Not knowing where it came
24 from, I'd have to know more details to...

25 Q (BY MS. HORAN) Do you see on the first

1 page there are five spiractors?

2 A Yes.

3 Q And do you see that there are five sand
4 filters?

5 A Yes.

6 Q And those numbers align with the numbers
7 included in Figure 3-1 of your report. And
8 you're -- I'm happy to let you look through your
9 report as well.

10 A Yes.

11 MS. BAUGHMAN: Object to the form.

12 THE WITNESS: Yes.

13 Q (BY MS. HORAN) Do you see that document
14 -- or Exhibit 5 has four elevated water storage
15 tanks?

16 A Yes.

17 Q Do you know how many elevated water
18 storage tanks Hadnot Point water distribution had
19 throughout time?

20 A I relied upon the AH Environmental.

21 Q You can set Exhibit 5 aside.

22 A (Witness complies.)

23 Q The Hadnot Point Water Treatment Plant
24 has an 800,000 water -- raw water reservoir.

25 Do you agree?

1 A That's my understanding.

2 Q And you agree that that reservoir is
3 vented?

4 A That would be the normal course. Yes.

5 MS. HORAN: I'm handing the witness what
6 I'll mark as Exhibit 6. And this has Bates
7 number Hennessey_USA_0000000010. And Bates ending
8 in 25, 30, and 31.

9 (Government Exhibit 6 marked for identification)

10 Q (BY MS. HORAN) Dr. Sabatini, have you
11 seen these images before?

12 MS. BAUGHMAN: Objection. Form and
13 foundation.

14 THE WITNESS: I'm -- they look similar
15 to something I've seen before.

16 Q (BY MS. HORAN) Could you turn to the
17 Bates ending in 31?

18 MS. BAUGHMAN: Object to the form.

19 Counsel, to the extent these are the
20 pictures that Dr. Hennessey took in February 2005
21 [sic] --

22 THE WITNESS: '25.

23 MS. BAUGHMAN: -- we've got a pending
24 motion to exclude those from the case. So I'll
25 let you ask limited questions with the

1 understanding that we may -- I would like the
2 court reporter to note that this may be separated
3 -- I would like it to be separated and marked
4 because we're going to move to exclude testimony
5 about this assuming our -- our motion is granted.
6 If our motion is granted.

7 Go ahead.

8 MS. HORAN: Sure.

9 MS. BAUGHMAN: Because we don't know the
10 foundation of this. Dr. Hennet wasn't asked
11 questions about these. There's no report about
12 them.

13 MS. O'LEARY: Objections are limited to
14 form and foundation.

15 MS. BAUGHMAN: I understand.

16 MS. O'LEARY: We just said --

17 MS. BAUGHMAN: Not if -- not if it has
18 to do with a motion pending before the court.
19 I'm allowed to explain the basis of that motion.

20 And by the way, you're not the lawyer.
21 She's the one who's supposed to be speaking here.
22 One lawyer.

23 Please mark this because we're going to
24 move to exclude testimony about this -- about
25 this exhibit.

1 Go ahead.

2 MS. HORAN: Okay. Are you done?

3 MS. BAUGHMAN: Done.

4 MS. HORAN: Okay.

5 Q (BY MS. HORAN) Could you please turn to
6 the one ending in 31? Do you see that? Okay.

7 Do you see there are two vents in this
8 image?

9 MS. BAUGHMAN: Objection. Form and
10 foundation.

11 THE WITNESS: Yes.

12 Q (BY MS. HORAN) Are those vents that
13 you've seen similar to other vents you've seen on
14 the top of a water reservoir?

15 A In general, yes.

16 Q And then could you turn to the Bates
17 ending in 30?

18 A Which one? 30?

19 Q Yeah.

20 A (Witness complies.)

21 Q And do you see a vent in the image?

22 A Yes.

23 Q And is that vent similar to the vents
24 you would have seen or expect to see on top of a
25 water reservoir?

1 A Same. In general, yes.

2 Q Could you turn to Image 10 which is the
3 first page.

4 A Number -- which number?

5 Q 10. It's the first page.

6 A 10.

7 Q Yeah.

8 And do you see a picture of a vent?

9 A Yes.

10 MS. BAUGHMAN: Objection. Form and
11 foundation.

12 Q (BY MS. HORAN) And is this a vent the
13 type you would expect to see on top of a water
14 treatment reservoir?

15 MS. BAUGHMAN: Same objections.

16 THE WITNESS: At times.

17 Q (BY MS. HORAN) And you can see some
18 measurements for the -- along the right side of
19 it. Fair?

20 MS. BAUGHMAN: Objection. Form and
21 foundation.

22 Q (BY MS. HORAN) Do you see that?

23 A Yes.

24 Q Is that the size and shape that you
25 would expect to see of a vent atop a water

1 treatment reservoir?

2 A It varies, but not atypical.

3 Q And then could you turn to Page 25 which
4 is the second page in the document?

5 A (Witness complies.)

6 Q Is this also the -- or do you see a vent
7 in the image?

8 MS. BAUGHMAN: Objection. Form and
9 foundation.

10 THE WITNESS: This one's a lot less
11 clear. What it's showing.

12 Q (BY MS. HORAN) And why is this one less
13 clear what it's showing?

14 MS. BAUGHMAN: Same objections.

15 THE WITNESS: The others all seem to be
16 -- this one seems to...

17 Q (BY MS. HORAN) Ah. So is this just a
18 different shaped vent?

19 MS. BAUGHMAN: Objection. Form and
20 foundation.

21 Q (BY MS. HORAN) Is that what you're
22 referencing?

23 A I'm not sure what this one is.

24 Q Have you ever seen a vent that looks
25 like the vent in Image 25?

1 A I'm not sure what this is.

2 Q Do you know one way or the other whether
3 this looks like a vent?

4 MS. BAUGHMAN: Objection to form.

5 THE WITNESS: I'd need to -- I'd need to
6 know more to comment on this one.

7 Q (BY MS. HORAN) What would you need to
8 know, Dr. Sabatini?

9 A Where is it? What is it? What's it's
10 purpose?

11 Q Does this structure in Image 25 look
12 like something that could vent a water treatment
13 reservoir?

14 MS. BAUGHMAN: Objection. Form and
15 foundation.

16 THE WITNESS: Based on this picture, I
17 can't comment.

18 Q (BY MS. HORAN) Okay. You can put those
19 aside.

20 A (Witness complies.)

21 Q I rent -- -- strike that.

22 A vented raw water reservoir will
23 maintain an atmospheric pressure; correct?

24 MS. BAUGHMAN: Objection to form.

25 THE WITNESS: In general, yes.

1 Q (BY MS. HORAN) You would agree that the
2 VOCs in the water at a vented raw water reservoir
3 will dissipate to reach equilibrium with the VOCs
4 in the atmosphere at the ratio of Henry's
5 constant?

6 A Say that one more time.

7 Q Sure.

8 You would agree that the VOCs in the
9 water at a vented raw water reservoir will
10 dissipate to reach equilibrium with the VOCs in
11 the atmosphere at the ratio of Henry's constant?

12 A I would not agree.

13 Q And why not?

14 A Because there's a kinetic aspect,
15 time-dependent aspect. So given enough time, I
16 would agree. Given enough time to reach
17 equilibrium. But the kinetics determine how
18 close you're able to get to equilibrium in a
19 limited amount of time.

20 Q Sure.

21 So the equilibrium would be attached to
22 the rate at which the air could flow through the
23 vents of the raw water reservoir.

24 MS. BAUGHMAN: Objection to form.

25 THE WITNESS: Say that again.

1 Q (BY MS. HORAN) The time it would take
2 to reach equilibrium would be controlled in some
3 manner by the rate of flow of air through the
4 vents.

5 We can move on.

6 A Say again.

7 Q I'll withdraw the question. We can move
8 on.

9 In your Coke analogy, having a vented
10 raw water reservoir is similar to having the cap
11 off of a Coke bottle; correct?

12 A No.

13 Q Why not?

14 A What you just described would be saying
15 that the entire top of the reservoir was opened.

16 Q So your disagreement of a vent -- of
17 comparing a vented raw water reservoir and the
18 cap of a Coke bottle is the difference in size?

19 A Yeah, the -- the extent to which it's
20 opened to the atmosphere.

21 Q Could you -- what -- strike that.

22 The -- would a vented raw water
23 reservoir be similar to having a straw in a Coke
24 bottle?

25 A No.

1 Q And why not?

2 A Well, for one thing, to have the straw
3 in the Coke bottle, you have the lid off.

4 Q Oh, sure. Okay.

5 So you -- you've sliced a perfectly
6 sized --

7 A If you drilled a -- well...

8 Q -- hole into the -- if you drilled a
9 hole into the cap bottle for a straw, would that
10 be sufficient?

11 A That would -- a very small hole.

12 Q Okay. So having a vented raw water
13 reservoir is similar to having a Coke bottle with
14 a straw-sized hole drilled into the cap.

15 MS. BAUGHMAN: Objection to the form.

16 THE WITNESS: A very small hole in the
17 lid of the Coke bottle. Just look at --

18 Q (BY MS. HORAN) You would agree that the
19 water towers are vented; correct?

20 A Correct.

21 Q And you agree that the water towers will
22 maintain atmospheric pressure?

23 A Over time. Correct.

24 Q And you agree that the VOCs in the water
25 at the vented water towers will dissipate to

1 reach equilibrium at the VOCs in the atmosphere
2 at a ratio of Henry's constant?

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: No.

5 Refer back to the kinetic discussion
6 from before.

7 Q (BY MS. HORAN) So your disagreement is
8 in the speed at which it will occur?

9 A (Nods head.)

10 Q But it will occur; correct?

11 MS. BAUGHMAN: Object to the form.

12 Q (BY MS. HORAN) Or I can -- let me
13 rephrase.

14 A Given an --

15 MS. BAUGHMAN: She wants to rephrase it
16 so let her do that.

17 THE WITNESS: Okay.

18 Q (BY MS. HORAN) With sufficient time,
19 the VOCs in the water at the vented water tower
20 will dissipate to reach equilibrium with the VOCs
21 in the atmosphere at the ratio of Henry's
22 constant.

23 MS. BAUGHMAN: Object to the form.

24 THE WITNESS: I disagree because there's
25 not sufficient time.

1 Q (BY MS. HORAN) And if there were
2 sufficient time, would you agree?

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: I'm tempted to go into
5 teaching mode here.

6 Q (BY MS. HORAN) Just answer the ques- --
7 if that --

8 A No, it's not.

9 Q Please, go ahead.

10 A It's not the same.

11 Q Okay. So a vented water tower, even
12 with days, weeks --

13 A It --

14 MS. BAUGHMAN: Wait. Let her finish.

15 Q (BY MS. HORAN) -- even with however
16 much time, would never equilibrate with the
17 atmosphere at Henry's constant.

18 MS. BAUGHMAN: Object to the form.

19 THE WITNESS: Depends upon how you
20 define "sufficient time." Given an infinite
21 amount of time, yes. Or not even infinite. I
22 mean, given a dramatically larger time, yes.

23 Q (BY MS. HORAN) And a dramatically
24 larger time than what?

25 A Than the detention time in the basins.

1 Q And I believe we got to a place where if
2 it's a Coke bottle with a hole drilled in the
3 top, then that would be similar to a vented water
4 tower.

5 Is that fair?

6 MS. BAUGHMAN: Object to the form.

7 THE WITNESS: Yes. There's one caveat.
8 Where my Coke bottle analogy breaks down is the
9 carbon dioxide in the head space is pressurized.

10 Q (BY MS. HORAN) Uh-huh.

11 A It's pressurized CO2. That's how you
12 get the carbonation into the water. It's
13 pressurized.

14 Q Uh-huh.

15 A Where as the VOCs in the head space
16 above the water are not pressurized. So that's a
17 difference between the -- that's the place where
18 the Coke bottle analogy breaks down to water
19 reservoirs.

20 Q Sure.

21 And in the water towers, as the water
22 levels fluctuate throughout the day or week, the
23 air will naturally be pushed out or sucked in to
24 the water tower; correct?

25 MS. BAUGHMAN: Object to the form.

1 THE WITNESS: Right.

2 Q (BY MS. HORAN) And that's also
3 different than a Coke bottle because once it's
4 sealed, no more liquid goes in.

5 A Correct. Although, in one of my
6 analogies, I suggested Coke was flowing into and
7 out of the Coke bottle. But correct.

8 Q Do you know whether the water buffaloes
9 used at Camp Lejeune from 1950 to 1987 had vents?

10 A Are...

11 Q Had vents.

12 MS. BAUGHMAN: Object to the form.

13 THE WITNESS: It depends upon what you
14 mean by vents. They had filler caps and they had
15 manholes. Not -- not vents, to my knowledge, of
16 the nature that -- I'm not sure. I'm unclear.

17 (Government Exhibit 7 marked for identification)

18 Q (BY MS. HORAN) I'm marking as Exhibit 7
19 -- this is a document with the Bates
20 Brigham_USA_00000044016. And it runs through the
21 Bates ending in 4038.

22 MS. BAUGHMAN: Which number is this one?

23 MS. HORAN: 7.

24 THE WITNESS: 7.

25 Q (BY MS. HORAN) And I'll represent this

1 is a document that you -- it's on your materials
2 list. But it's -- I did cut off -- it didn't
3 print off of the document so this is a shortened
4 version of it.

5 Have you seen this before, to the best
6 of your recollection?

7 A Looks -- looks familiar.

8 Q And you agree this is for the M107 water
9 buffaloes?

10 A Say again.

11 Q This is for the M107 water buffaloes?

12 A I'm looking for that designation.

13 Q If you turn to Page 4017. The --

14 A Oh, down there. Seems to be for the
15 trailer.

16 Q So is it trailer tank water one, one
17 half-ton two-wheel 400-gallon, and then it says
18 M107A1, M107A2, M107A2C.

19 A Okay.

20 Q Do you see that?

21 A Yes.

22 Q Okay. Could you turn to the page ending
23 in 4031?

24 A (Witness complies.)

25 Q And do you see the top of the page, it

1 says C, the letter, M107 series water tank
2 trailer?

3 A Yes.

4 Q Okay. And then a little bit further
5 down the page, there's a key and a chart. And
6 the second thing listed is the component vent.

7 Do you see that?

8 A Yes.

9 Q And the description of the vent is
10 "allows air circulation in the tank".

11 Do you see that?

12 A Yes.

13 Q And do you see that that is keyed to
14 number 21?

15 A Yes.

16 Q And number 21 in the image points to the
17 water buffalo just in front of the manhole.

18 A Yes.

19 Q Okay. Do you agree that the M107 water
20 buffalo series had vents?

21 MS. BAUGHMAN: Object to the form.
22 Foundation.

23 THE WITNESS: Based on this document,
24 that seems to be the suggestion.

25 Q (BY MS. HORAN) Did you consider, in

1 your calculations, water buffaloes having any
2 vents?

3 A Not a vent specific, but with the filler
4 pipe and the manhole acting as a venting basis.

5 Q Would the manhole continue to vent the
6 water even after it's closed?

7 A No.

8 Q Would you -- do you know, one way or the
9 other, whether the vent in this image would allow
10 the water to continue to be vented even after the
11 manhole is closed?

12 MS. BAUGHMAN: Objection. Form and
13 foundation.

14 THE WITNESS: Say again.

15 Q (BY MS. HORAN) Sure.

16 So the vent in this image that says
17 "allows air circulation in tank," do you know
18 whether that is, I guess, a permanent vent or
19 whether...

20 A I'm -- I'm not sure.

21 Q In your opinion -- in preparing your
22 opinions on water buffaloes, did you do any work
23 to determine whether any other models had vents
24 or when they were installed?

25 MS. BAUGHMAN: Object to the form.

1 THE WITNESS: We looked at the different
2 forms over time. Not specifically looking for an
3 individual component, but looking at the overall
4 nature of the water buffaloes.

5 Q (BY MS. HORAN) And do you recall
6 looking at whether those components included a
7 vent?

8 MS. BAUGHMAN: Object to the form.

9 THE WITNESS: No. Not that I recall.
10 I'd have to go back and look at my -- have to go
11 back and look at my materials.

12 Q (BY MS. HORAN) Sure.

13 A Because a vent seems -- anyway. Go
14 ahead.

15 Q So turning -- turning to water flow. So
16 the water flows in -- the water system at Camp
17 Lejeune flows from water towers into the
18 distribution system where it eventually ends up
19 in peoples' homes.

20 Is that fair?

21 A Yeah. That would be the -- correct.

22 Q And then between the time that the water
23 leaves the tap and when it's ingested, there
24 would be some additional VOC losses.

25 Is that fair?

1 MS. BAUGHMAN: Objection. Form and
2 foundation.

3 THE WITNESS: That's hard to say.
4 There's that possibility, but it's hard to know
5 without more details.

6 Q (BY MS. HORAN) It would depend on the
7 time that the water is out of the tap and the way
8 the water's used.

9 Is that fair?

10 A And the spray and the surface area and
11 time.

12 Q And if the water is boiled when it's
13 exposed to the atmosphere, the losses will occur
14 faster than if it's left exposed to the
15 atmosphere at room temperature.

16 Is that fair?

17 A Would typically be the case.

18 Q And when the water is mixed, losses will
19 occur faster than if it's left exposed to the
20 atmosphere and not mixed.

21 Fair?

22 MS. BAUGHMAN: Objection to form.
23 Foundation.

24 THE WITNESS: In general, yes.

25 Q (BY MS. HORAN) And Henry's Law would

1 continue to govern equilibrium concentrations?

2 A Say again.

3 Q Henry's Law would continue to govern the
4 equilibrium concentrations?

5 A Henry's Law governs the equilibrium
6 concentration. But always have to remember
7 kinetics.

8 Q Sure.

9 And because there are essentially no
10 VOCs in the atmosphere, Henry's Law dictates that
11 the water exposed to the atmosphere will lose
12 essentially all VOCs.

13 MS. BAUGHMAN: Objection to form.

14 THE WITNESS: Again, that's a
15 time-dependent question.

16 Q (BY MS. HORAN) And given sufficient
17 time, the answer is yes?

18 MS. BAUGHMAN: Objection to form.

19 THE WITNESS: And then the question is,
20 what is sufficient time? So yes. Given an
21 ultimate amount of time, that would be the case.

22 Q (BY MS. HORAN) You agree that the water
23 treatment plant will not add VOCs to the water.

24 A It's -- it's hard to imagine how that
25 would be. No, I agree that that's very, very,

1 very unlikely.

2 Q Have you ever been involved with a
3 project or experienced anything where a water
4 treatment plant added VOCs to the water?

5 A No.

6 Q I want to turn to the AH Environmental
7 report that is attached to your report. So I'm
8 turning back to Exhibit 2. And you have it
9 attached to your report as Exhibit D.

10 I think we've mostly been doing this,
11 but if I refer to the AH Environmental report,
12 you'll understand I mean Exhibit D of your
13 report; correct?

14 A (Nods head.)

15 Q Is that yes?

16 A Correct. Sorry. Correct.

17 Q When did you first read this report?

18 A Oh, that would be probably -- roughly a
19 year ago.

20 Q And I -- where did you -- strike that.
21 Did you find this on the Internet?

22 A No.

23 Q Was this provided to you?

24 A Yes.

25 Q Do you -- so this doesn't have any Bates

1 numbers on it. Do you understand what Bates
2 numbers are?

3 A I'm sorry?

4 Q Do you -- so a Bates number. Are you
5 familiar with that term?

6 A I've become familiar with it.

7 Q Fair enough.

8 In your AH Environmental report, the --
9 the one that you received did not have Bates --

10 A No.

11 Q -- numbers on it either? This is --

12 A Yeah, this is what I received.

13 Q Okay. I believe, earlier, you testified
14 to having spoken with Mr. Maslia a handful of
15 times.

16 Was counsel present for all of those
17 meetings?

18 A Say again.

19 Q When you spoke with Mr. Maslia --

20 A Maslia. Yes.

21 Q -- was counsel present for those
22 meetings?

23 A Yes.

24 Q Could you turn to Page 1-1 of the AH
25 Environmental report?

1 A (Witness complies.)

2 Q Okay. The final paragraph, first
3 sentence, reads, "AH Environmental Consultants,
4 Inc., AH, was retained by MCB Camp Lejeune under
5 contract number DACW5603R1013 to assist ATSDR in
6 obtaining information required for the modeling
7 efforts in the epidemiological study."

8 Did I read that correctly?

9 A Yes.

10 Q Do you agree with AH Environmental
11 Consultants that an estimation of VOC removal at
12 the water treatment plant would be important
13 information, even required, for the modeling
14 efforts of epidemiological studies at Camp
15 Lejeune?

16 MS. BAUGHMAN: Objection. Form and
17 foundation.

18 THE WITNESS: Say that again.

19 Q (BY MS. HORAN) Sure.

20 Do you agree --

21 MS. BAUGHMAN: Can you show him where it
22 says that? I don't see where it says that in the
23 document. Important and required information.

24 MS. HORAN: Well, it says, "Obtaining
25 information required for the modeling efforts,"

1 in 1-1. Do you see the first sentence in the
2 last paragraph, Laura?

3 MS. BAUGHMAN: (Nods head.)

4 MS. HORAN: Okay. I'm going to ask my
5 question.

6 Q (BY MS. HORAN) Do you agree with AH
7 Environmental Consultants that an estimation of
8 VOC removal at the water treatment plant is
9 required information for the modeling efforts in
10 the epidemiological study at Camp Lejeune?

11 MS. BAUGHMAN: Objection form; objection
12 foundation.

13 THE WITNESS: I agree that that
14 statement's in the document.

15 Q (BY MS. HORAN) And do you personally
16 agree with that?

17 MS. BAUGHMAN: Objection. Form and
18 foundation.

19 THE WITNESS: Depending upon the degree
20 of volatilization.

21 Q (BY MS. HORAN) Is it your understanding
22 that the purpose of the water modeling efforts at
23 Camp Lejeune were in support of epidemiological
24 studies?

25 MS. BAUGHMAN: Objection. Form,

1 foundation.

2 THE WITNESS: That was beyond the scope
3 of my expertise or involvement.

4 Q (BY MS. HORAN) So you have no opinion
5 on the purpose of the water modeling at Camp
6 Lejeune?

7 A My understanding was it was related to
8 potential exposures. But that's the extent of my
9 understanding.

10 Q Exposures in the sense of
11 epidemiological studies? Or individuals? Or
12 what do you mean when you say "exposures"?

13 MS. BAUGHMAN: Objection. Form and
14 foundation.

15 THE WITNESS: My involvement was focused
16 on the water quality. So I wasn't involved in
17 the specifics of what was going to happen beyond
18 that.

19 Q (BY MS. HORAN) When you say your
20 involvement was in the water quality, what do you
21 mean by that?

22 A Well, what we're talking about. My
23 expert report.

24 Q Oh, okay. And you don't intend to offer
25 any opinion in court about that purpose of the

1 water modeling.

2 A Say again.

3 Q You don't intend to offer any opinion in
4 court on the purpose of the water modeling?

5 A Not beyond what's in my expert report.

6 Q Okay. You can set that aside. Or, I
7 guess, actually turn to Page 7.

8 A 7?

9 Q Yeah. Of your report. Which is Exhibit
10 2.

11 A (Witness complies.)

12 Q So looking at your first opinion which
13 begins on Page 7, you opine that only minor VOC
14 losses occurred in these systems.

15 Do you see that?

16 A Correct.

17 Q And "these systems" refers to storage
18 treatment and distribution of water at Camp
19 Lejeune?

20 A Correct.

21 Q You underline the word "minor".

22 Do you see that?

23 A Yes.

24 Q Why?

25 A Show its contrast to Hennet's

1 substantial.

2 Q And you define minor as less than 6 to
3 12 percent VOC loss.

4 Is that fair?

5 MS. BAUGHMAN: Objection to form.

6 THE WITNESS: It's a relative term to
7 substantial. Yes.

8 Q (BY MS. HORAN) You're not a
9 toxicologist, are you?

10 A No. Say again.

11 Q You're not a toxicologist?

12 A No, I'm not. No.

13 Q And you're not a medical doctor?

14 A No.

15 Q So when you say that 6 to 12 percent VOC
16 loss is minor, you're not speaking about in terms
17 of someone's exposure.

18 Is that fair?

19 MS. BAUGHMAN: Objection. Form and
20 foundation.

21 THE WITNESS: That's beyond the scope of
22 my efforts.

23 Q (BY MS. HORAN) You're not qualified to
24 make the assessment of 6 to 12 percent VOC loss
25 as minor, are you?

1 MS. BAUGHMAN: Objection to form.

2 THE WITNESS: Well, from a water
3 chemistry perspective which is a focus of my
4 work, I would consider that minor. And that was
5 the extent of my focus.

6 Q (BY MS. HORAN) Sure.

7 And you're not making the assessment
8 that 6 to 12 percent VOC loss is minor in the
9 context of someone's exposure; correct?

10 A That's beyond my expertise and
11 involvement.

12 Q And when you say 6 to 12 percent is
13 minor, how did you come to the determination that
14 that's minor?

15 MS. BAUGHMAN: Objection to form.

16 THE WITNESS: It was in response to
17 Hennessey's substantial. Suggestion that there was
18 substantial losses. Also just -- well, I think
19 actually AH Environmental said negligible -- said
20 10 percent was negligible losses in their expert
21 review panel meeting. So minor, in a way, is
22 more generously negligible.

23 Q (BY MS. HORAN) So are you repeating
24 someone else's characterization or --

25 A Yes.

1 Q -- is it your characterization as minor?

2 A AH Environmental represented Pomm- --
3 Pommerenk or -- his name -- in the 2005 expert
4 panel -- was asked about losses. And said 90
5 percent goes through, 10 percent losses, and
6 consider that negligible.

7 Q So when you wrote "minor" in your
8 report, you were adopting what you believed to be
9 Mr. Pommerenk's characterization --

10 MS. BAUGHMAN: Objection to form.

11 Q (BY MS. HORAN) -- or what an I --

12 MS. BAUGHMAN: Objection to form.

13 THE WITNESS: I wasn't adopting, no. I
14 was saying, in a relative sense, these losses to
15 me seemed minor relative to Hennet, relative to
16 Pommerenk, et cetera. I felt justified in
17 choosing the term minor.

18 Q (BY MS. HORAN) If you -- so you put in
19 your report -- and this is on Page 6.

20 A 6?

21 Q 6. Yeah. So just to go over it.

22 The last sentence of the first bullet
23 says, "Rather than 15 to 32 percent losses by Dr.
24 Hennet's calculations, I estimate less than 6 to
25 12 percent losses for the range of VOCs."

1 Do you see that sentence?

2 A Yes.

3 Q Page 14 of your report, Table 5.3, is
4 your calculations for losses.

5 Fair?

6 A Yes.

7 Q None of those numbers are less than 6.

8 A Well --

9 Q Fair?

10 A None of the numbers listed in the table.

11 MS. BAUGHMAN: I'm going to object to
12 the form.

13 THE WITNESS: Granted, I rounded 6.3
14 down to 6 which is mathematically...

15 Q (BY MS. HORAN) Sure.

16 But none of your numbers come up as less
17 than 6. Is that fair?

18 MS. BAUGHMAN: Objection to the form.

19 THE WITNESS: They do to the extent that
20 I say less than 1 percent in the storage tanks
21 and less than 1 in other losses.

22 Q (BY MS. HORAN) So when you were saying,
23 on Page 6, you estimate less than 6 to 12 percent
24 losses for the range of VOCs, you were breaking
25 that to include individual components of your

1 overall calculation?

2 MS. BAUGHMAN: Objection to form.

3 THE WITNESS: Those individual
4 components are included in the 6.3 value.

5 Q (BY MS. HORAN) Sure.

6 I'm just -- I'm just wondering why you
7 included less than 6 if the lowest number I see
8 on your chart is --

9 A Yeah.

10 Q -- 6.3.

11 Is it just a typo? I mean, I'm just --

12 A It's -- you could -- from Table 5.3, I'm
13 saying the lowest value might have been less than
14 6. 6.3, 6. So I was just carrying that forward
15 to my summary statement.

16 Q Okay. So you used less than 6 percent
17 because Table 5.3 for benzine says less than 6.3.

18 A Correct.

19 Q Okay. As you've used it in your report,
20 how do you define raw water?

21 A Water --

22 MS. BAUGHMAN: Objection to form.

23 THE WITNESS: Water -- generally, in the
24 water treatment industry, raw water is the water
25 coming into the water treatment plant.

1 Q (BY MS. HORAN) So raw water as defined
2 in your report is pre-treatment.

3 Fair?

4 A Yes.

5 Q It's your opinion that assumptions that
6 Dr. Hennes made in his calculations are what led
7 to the overestimation of his VOC loss
8 calculations.

9 Is that fair?

10 MS. BAUGHMAN: Objection to form.

11 THE WITNESS: Say again.

12 Q (BY MS. HORAN) It's your opinion that
13 assumptions that Dr. Hennes -- I'll start again.

14 Is it your opinion that assumptions in
15 Dr. Hennes's calculations led to overestimation?

16 A Assumptions of value that he assume --
17 values he assumed.

18 Q On Page 7 of your report, Figure 5.1 --
19 I think you have it in front of you. As to
20 Hadnot Point, you agree that VOCs would be lost
21 in the raw water storage reservoirs?

22 MS. BAUGHMAN: Objection to form.

23 THE WITNESS: Possibility for minor
24 losses.

25 Q (BY MS. HORAN) And in the schematic

1 which is Figure 5.1, there's losses at each stage
2 of Hadnot Point except for the supply wells and
3 the water distributions to your homes.

4 Is that fair?

5 MS. BAUGHMAN: Objection to form.

6 THE WITNESS: One more time. I'm sorry.

7 Q (BY MS. HORAN) Sure.

8 Figure 5.1 on your report.

9 A (Indicating.)

10 Q Yep.

11 VOCs would be lost at each stage except
12 for the supply wells and the water distribution
13 in the houses, but every other stage shown in
14 that image would incur VOC losses.

15 Fair?

16 MS. BAUGHMAN: Objection to form.

17 THE WITNESS: Possibly. It's a
18 possibility. Minor losses.

19 Q (BY MS. HORAN) And when you say "a
20 possibility of minor losses," do your
21 calculations -- is it just you're disputing the
22 volume of losses or that they would happen at
23 all?

24 MS. BAUGHMAN: Objection to form.

25 THE WITNESS: Just calculations indicate

1 that the losses that are possible would be very
2 minor.

3 Q (BY MS. HORAN) And why would they only
4 be possible?

5 A Say again.

6 Q Why would the losses only be possible
7 based on your calculations?

8 A Why would they only be possible?

9 Q Right.

10 Wouldn't your calculations suggest that
11 they're probable?

12 A Minor --

13 MS. BAUGHMAN: Objection to form.

14 THE WITNESS: Minor losses.

15 Q (BY MS. HORAN) Sure.

16 So there would be at least minor -- or
17 strike that.

18 It's your opinion that there would be at
19 least minor losses in all of the areas shown in
20 Figure 5.1 except supply wells and water
21 distribution.

22 MS. BAUGHMAN: Objection to form.

23 Q (BY MS. HORAN) Is that fair?

24 THE WITNESS: I'd say there's a
25 possibility of minor losses. That doesn't mean

1 necessarily that there will be -- they may be
2 negligible.

3 Q (BY MS. HORAN) And even if they were
4 negligible, there would be some loss.

5 Fair?

6 MS. BAUGHMAN: Objection to form.

7 THE WITNESS: Yeah, if you consider neg-
8 -- I wouldn't necessarily consider negligible
9 losses some losses, but there might be minor
10 negligible losses.

11 Q (BY MS. HORAN) You've used the term
12 "negligible". How do you determine what's
13 negligible in this field?

14 A That's probably a relative term. Well,
15 not relative. I mean it's -- I would consider
16 less than 1 percent, for example, is negligible.

17 Q And is that negligible in your --

18 A Of course, I say that, and AH considered
19 -- referred to 10 percent loss as negligible. So
20 it's hard to pin that down. It depends.

21 Q The negligible losses that you -- or
22 strike that.

23 When you say negligible losses, are you
24 saying negligible in your capacity as a
25 professional engineer or are you saying

1 negligible in the context of determining
2 someone's overall exposure as it relates to
3 health?

4 A No. Water -- drinking water treatment
5 perspective.

6 Q Okay. So you're not saying negligible
7 in the sense of how it might impact someone's
8 overall exposure as it determines --

9 A That's beyond my -- (simultaneous
10 crosstalk)

11 THE REPORTER: As it determines what?

12 MS. HORAN: Any type of health issue.

13 THE WITNESS: Sorry.

14 That's beyond my expertise to comment
15 on.

16 Q (BY MS. HORAN) Okay. Could you turn to
17 the AH Environmental report on Page 5-1?

18 A (Witness complies.) Yes.

19 Q Do you see the last paragraph? The
20 second sentence reads, "The only significant VOC
21 removals must have occurred at the spiractor
22 effluent pipe where the falling water undergoes
23 some aeration."

24 Do you see that?

25 A Yes.

1 Q Do you agree with AH Environmental that
2 significant VOC removals would occur at the
3 spiractor effluent pipe?

4 MS. BAUGHMAN: Objection to form.

5 THE WITNESS: "Significant's" a relative
6 term. I read what they're saying is, the only
7 quantifiable losses unless they use the word
8 "significant".

9 So what do you mean when you say
10 "significant"? So I think what they meant by
11 "significant" was later in the expert meeting,
12 they referred to these losses as minor
13 negligible. But here, they're saying the
14 potential loss -- as I read what they're saying,
15 my interpretation is they're saying, of potential
16 losses, this was the one that was most evidenced.

17 Q (BY MS. HORAN) And do you agree that
18 there's -- the most evidenced losses would be at
19 the spiractor effluent pipe?

20 A Yes.

21 Q Okay. And those numbers -- or strike
22 that.

23 The amount of losses at the VO -- strike
24 that.

25 The amount of VOC losses at the

1 spiractor effluent pipe would not be negligible.

2 Fair?

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: Under these conditions.

5 Q (BY MS. HORAN) Is that yes?

6 A Yes. Not negligible. Again, that term
7 negligible -- because again, in their 2005 expert
8 panel review, they referred to this level of
9 losses as minor negligible. So it -- it's a
10 relative term.

11 Q So turning back to your report on Page
12 7.

13 A Okay.

14 Q Looking at Figure 5.1. Of the
15 structures identified in that schematic, the
16 structure with the most significant VOC losses
17 would be the spiractor.

18 Fair?

19 MS. BAUGHMAN: Objection to form.

20 THE WITNESS: Based on the analysis and
21 calculations, that would be fair.

22 Q (BY MS. HORAN) Okay. Turning to your
23 opinion on spiractor which begins on Page 8 --
24 and you're, of course, welcome to reference your
25 report at any point during the deposition.

1 A Thank you.

2 Q Your opinion on the percentage loss of
3 TCE and PCE differs from Dr. Hennes's in that you
4 find that the effluent fall height is 1 foot and
5 Dr. Hennes used 2 feet.

6 Is that fair?

7 A That's correct.

8 Q Other than the fall height, is there
9 anything about Dr. Hennes's opinion related to
10 VOC losses at spiractors that you disagree with?

11 MS. BAUGHMAN: Objection to form.

12 THE WITNESS: Not in terms of the
13 calculation, no. I would qualify that by saying
14 I did comment that the spiractor water converges
15 in the center versus weir where it would be
16 flowing over the edge. And so it's not a
17 difference with Dr. Hennes's calculation, but it
18 is a qualification to the method applied.

19 Q (BY MS. HORAN) Sure.

20 And on Page 9, in the paragraph -- the
21 last full paragraph, nine lines down.

22 A Right. Yeah.

23 Q You say, "Thus, while I am not aware of
24 a better approach than Nakasone 1987 for making
25 this estimate, it is my opinion the estimated

1 values of VOC losses will be conservative higher
2 than actually experienced."

3 A Correct.

4 Q Did I read that correctly?

5 A Correct.

6 Q And so in materials of the weir that you
7 just described --

8 A No.

9 Q -- you're not aware of a better approach
10 for adding it to this calculation.

11 A No. Correct.

12 Q So you and Dr. Hennet essentially agree
13 on the methodology for calculating spiractor
14 losses and you disagree about one input.

15 Is that fair?

16 A Correct.

17 Q And you conclude that AH Environmental
18 used 1 foot for the water drop in the spiractor
19 effluent pipe, and that's justified.

20 Is that fair?

21 A Correct.

22 Q You're not offering any independent
23 assessment of the effluent pipe fall height.

24 A Correct.

25 MS. BAUGHMAN: Objection to form.

1 THE WITNESS: Correct.

2 Q (BY MS. HORAN) Is there any information
3 besides the AH Environmental report that you
4 relied on in determining the fall height of 1
5 foot is more justified?

6 A No.

7 Q Did you review the photos in AH
8 Environmental's report and determine for yourself
9 that the fall height was 1 foot or did you rely
10 on AH Environmental's analysis?

11 A I reviewed the figures and understood
12 the reasons for why they selected the 1-foot fall
13 height.

14 Q AH Environmental determined the
15 spiractor effluent pipe diameter was 12 inches.

16 Do you agree?

17 A That's the number that they used.
18 Correct.

19 Q Do you know precisely how they made that
20 measurement?

21 MS. BAUGHMAN: Objection to form.

22 THE WITNESS: It's in -- what I know is
23 it's in their document.

24 Q (BY MS. HORAN) And sitting here today,
25 what's your understanding of how they made that

1 measurement?

2 MS. BAUGHMAN: Objection to form.
3 Foundation.

4 THE WITNESS: They made it based upon a
5 flowing system where they were able to see the
6 constricted water down gradient reducing the fall
7 height, and they made an estimate based upon the
8 visual observation. It's my understanding. And
9 I think that's documented, and probably best to
10 actually go there.

11 I forget exactly where it is in the
12 report where they describe -- here it is. Page
13 3-7.

14 Q (BY MS. HORAN) Uh-huh.

15 A The fall height was estimated visually
16 based on recent photographs. And then on -- so
17 you see that?

18 Q I do. Yes. So --

19 MS. BAUGHMAN: Were you finished?

20 THE WITNESS: No.

21 Q (BY MS. HORAN) Oh.

22 A I'm sorry.

23 So then if we go to Figure 4-1, Page
24 4-2.

25 Q Uh-huh.

1 A You see a Hadnot Point spiractor showing
2 the evidence of the downstream constriction
3 limiting the fall height versus --

4 Q Sorry. Where are you looking?

5 A 4- -- Figure 4-1.

6 Q Yes. Oh, you're saying this image shows
7 that to you. You're not pointing to text in the
8 report.

9 A No, no.

10 Q Okay.

11 A I'm sorry. I'm looking at the figures.

12 Q Okay.

13 A And there -- well, in the text, they do
14 say they -- I've lost over where they say that.
15 But they picked 1 foot. But the pictures they're
16 relying upon, 4-1, you can see that the water
17 isn't free flowing in like it is in 4-3.

18 Q Uh-huh.

19 A And so Holcomb Boulevard, they said they
20 did get the 2-foot drop fall height where as in
21 Hadnot Point, because of the downstream
22 constriction from the recarbonation basin, that
23 back -- what I'll call back water, water wasn't
24 able to flow freely out of this pipe because of
25 that. And so we have the 1-foot drop.

1 Q For Figure 4-1, do you know whether
2 gravity filters were being backwashed when this
3 photo was taken?

4 A No. That's 4-2. They point out that
5 4-2 was after backwash filter went -- so that
6 clearly dem -- they were clearly demonstrating
7 the additional impact of the backwashing the
8 filters. With that -- well, I'll leave it at
9 that.

10 Q So I -- the -- I think -- so I
11 understand on 3-7, you pointed me to language
12 that says that the fall height was estimated
13 visually. But I believe -- do you know how they
14 measured the pipe diameter?

15 A No, I do not.

16 Q Okay. So we're at 12:05. Do we want to
17 take a break for lunch?

18 A I can go a little bit longer or --

19 MS. BAUGHMAN: If you want to, we can.
20 It's up to you.

21 He's willing to go.

22 So you decide.

23 THE WITNESS: Go another 15 minutes or
24 so. Fifteen, 20 minutes.

25 Q (BY MS. HORAN) Sure. We can keep

1 going. Okay.

2 Okay. So you agree that AH
3 Environmental did not measure the Hadnot Point
4 effluent fall height; they just visually
5 estimated it. Fair?

6 MS. BAUGHMAN: Objection to form.
7 Foundation.

8 THE WITNESS: I would say that they made
9 a measurement based on a visual -- they made a
10 measurement based on a visual product.

11 Q (BY MS. HORAN) Sure.

12 They didn't measure it. They made a
13 visual estimation. Fair?

14 A They didn't go out and measure it. They
15 measured it from the picture which is a
16 measurement in and of itself.

17 Q Sure.

18 But they didn't go into the field, as
19 far as you're aware, and measure it with a
20 measuring tape. Fair?

21 A Not to my knowledge. But I'll add that
22 a measurement on an empty pipe is of less value
23 than a measurement on a flowing pipe. Because an
24 empty pipe doesn't give you the indication of the
25 -- what we're seeing in Figure 4-1. The

1 important value is how far does that water fall
2 before it hits bottom, the water.

3 Q Uh-huh.

4 A And that's the volatilization. And so
5 just measuring the pipe -- measuring the fall
6 height, for example, from Figure 3-2, you have no
7 indication of where the water level is dropping
8 to in that pipe. You don't have any idea of the
9 actual fall height. All you know is what's the
10 dimension for an empty spiractor effluent pipe.

11 So for me, a visual measurement from a
12 picture, we're actually seeing the constricted
13 water decreasing the fall height is more valuable
14 than a measurement on an empty pipe where you
15 have no idea what it was like under operating
16 conditions.

17 Q Do you know if AH Environmental
18 estimated based on image of a pipe being used or
19 an empty pipe?

20 A Let's find their discussion. Okay.
21 Just above Figure 4.4-1. Okay. So let's start
22 with only a small vortex.

23 Do you see that?

24 Q Uh-huh.

25 A Formed over the submerged effluent pipe

1 4-1 on one spiractor and they developed an nappe
2 after a backwash filter went back online.
3 Because of the downstream recarbonation basin at
4 that plant, available head does not appear to
5 allow fall height of greater than 1 foot. And so
6 -- indicating that they were taking into account
7 the downstream recarbonation basin reducing the
8 fall height. Then they go on to say, however, at
9 Holcomb Boulevard -- because there was no
10 recarbonation basin, water falls 2 feet.

11 Q So based on 4.1, you determined that it
12 was reasonable for there to be a 1-foot fall
13 height at Hadnot Point based on this image?

14 MS. BAUGHMAN: Objection to form.

15 THE WITNESS: That confirmed in my mind
16 their decision to go with a 1-foot fall height
17 versus Figure 4-3 for Holcomb Boulevard where
18 there's no evidence of that back -- that
19 constriction reducing the fall height they said
20 there would be 2 feet.

21 Q (BY MS. HORAN) Okay. And how they
22 determined the 1 foot, what image did you use
23 from AH Environmental besides -- or maybe there's
24 none.

25 Did you use any images besides 4.1 to

1 confirm your belief that 1 foot was a reasonable
2 estimation?

3 MS. BAUGHMAN: Objection to form.

4 THE WITNESS: Figure 4.1 confirmed in my
5 mind why they chose a 1-foot fall height. And I
6 know they were -- they had a longer term contract
7 at this site. So I trusted that, being
8 professional engineers, they were taking
9 appropriate measures to make these
10 determinations.

11 Q (BY MS. HORAN) Could you turn to 3-8?

12 A 3-8?

13 Q Yeah.

14 A Yes.

15 Q You see the image says Hadnot Point
16 Water Treatment Plant spiractor effluent pipe,
17 1941, 1942?

18 A Correct.

19 Q Is it your understanding that AH
20 Environmental is representing that this image was
21 taken in 1941 or '42? Or what's your
22 understanding of that?

23 MS. BAUGHMAN: I'm sorry. Are you on
24 Page 3-8 or Figure 3-8?

25 MS. HORAN: Page 3-8.

1 THE WITNESS: Page 3-8.

2 MS. BAUGHMAN: Okay. Thank you.

3 THE WITNESS: Can you ask that again?

4 Q (BY MS. HORAN) Sure.

5 You see the figure says Hadnot Point
6 water treatment plant -- well, it says WTP --
7 spiractor effluent pipe 1941 to 1942?

8 A (Nods head.)

9 Q Is it your understanding that AH
10 Environmental is representing that this photo was
11 taken in 1941 or '42 or what -- what do they mean
12 by that?

13 Do you know?

14 MS. BAUGHMAN: Objection. Form and
15 foundation.

16 THE WITNESS: I couldn't speak to that.

17 Q (BY MS. HORAN) Have you ever personally
18 measured a spiractor pipe?

19 A No.

20 Q Do you know if it's even possible to
21 measure the fall height of a spiractor while it's
22 in use?

23 A Say that again.

24 Q Is it even -- strike that.

25 Is it possible to measure the fall

1 height of a spiractor effluent pipe while the
2 spiractor is in use?

3 A I mean I guess, theoretically, it would
4 be possible. But if you look at the -- looking
5 for the schematic. So if you look at Figure 3-1.

6 Q Uh-huh.

7 A On Page 3-7.

8 Q Yep.

9 A The effluent pipe is in the center of a
10 10-foot diameter reactor. So that would make it
11 -- certainly would -- certainly be possible.

12 Q And it's also in the middle of a 22-foot
13 drop. Fair?

14 A Correct. Correct.

15 Q So to measure an effluent pipe from a
16 spiractor, you have to figure out how to get some
17 type of measurement perched over a 22-foot drop
18 in the middle of a 10-foot wide metal container
19 of sorts.

20 Is that fair?

21 A Well, let's look at Page 2-9. Figure
22 2-4.

23 Q Uh-huh.

24 A I mean, if we're talking about the
25 realms of possibility.

1 Q How would you go about measuring a
2 spiractor effluent pipe while a spiractor is in
3 use, to determine the fall height?

4 A Well, I might take a picture.

5 Q All right. You would take a picture?

6 A I might. I mean that...

7 Q And from Image 2.4 -- or Figure 2.4 on
8 2-9 that you pointed us to, can you figure out
9 the fall height from this image? Or what type of
10 image would you need?

11 A No, no. Not this picture itself. Let
12 me -- the picture that they have here would be
13 one way to approach it. The --

14 MS. BAUGHMAN: You have to say what
15 "here" is.

16 THE WITNESS: I'm sorry. Figure 4-1.
17 Sorry.

18 Q (BY MS. HORAN) So if an image of --
19 like 4-1 was sent to you, you could figure out
20 the fall height based on this image alone?

21 MS. BAUGHMAN: Objection to form.

22 THE WITNESS: That would be -- that
23 would be one approach. Probably be a safer
24 approach. But you could potentially try to rig
25 up some kind of a -- I don't know. Today, maybe

1 we'd use a drone.

2 MS. BAUGHMAN: You have to explain what
3 you're looking at when you say that.

4 THE WITNESS: Oh, I'm sorry. Figure 2-4
5 Page 2-9.

6 If we're trying to get that, you could
7 rig up some kind of mechanism and try and figure
8 that out.

9 Q (BY MS. HORAN) What mechanism would you
10 rig up?

11 A I'd have to think about it.

12 Q Well, it might be a good time for lunch
13 then.

14 A Okay.

15 MS. HORAN: Can we go off the record,
16 please?

17 THE VIDEOGRAPHER: Off the record.
18 12:16 p.m.

19 (Lunch break from 12:16 p.m. to 1:16 p.m.)

20 THE VIDEOGRAPHER: We're back on the
21 record at 1:16 p.m.

22 MS. BAUGHMAN: Okay. I just want to put
23 on the record, before we start, that I stated,
24 off the record, a few minutes ago, that the
25 materials considered list -- that there's some

1 confusion about that in that the vast majority of
2 the documents that start at Page 9 of 30,
3 additional materials considered, are materials
4 that were provided well -- a year or more -- let
5 me see -- at least six months before Dr.
6 Sabatini's rebuttal report was prepared, and are
7 background materials not specifically relied upon
8 for the volatilization opinions or any opinion in
9 his rebuttal report, exception being the ones
10 that are -- didn't exist at the time which are
11 depositions, and another exception being a
12 document with the Bates stamp CLW0000005176
13 through 5182. And --

14 MS. HORAN: Could you read the title of
15 the document? Because I think --

16 MS. BAUGHMAN: Grainger Laboratories
17 Inc., Letter of August 10, 1982. It's possible
18 this was disclosed earlier, but if not, then that
19 might be one that's new that hadn't been
20 disclosed before as something that Dr. Sabatini
21 is relying on that does relate to volatilization.

22 So in other words, we received -- the
23 reason I'm saying this is we received an email
24 from Adam Bain which I read during lunch that
25 complains about the new documents and the

1 reliance list, and the point being that with the
2 exception of one document, and with the exception
3 of documents that didn't exist at the time that
4 the rebuttal report was submitted to the -- to
5 the government, there is only one new document.
6 Which I can give you a copy of now, if you want.
7 And the rest of this is pure background
8 information about Camp Lejeune not specifically
9 relied upon for his opinions.

10 Now, there could be -- I'll say one
11 caveat. There could be an overlap in that
12 documents on Pages 1 through 8 may be duplicative
13 of documents from 9 through 30. If it's in 1
14 through 8, what I've said does not apply.

15 MS. HORAN: Okay. Sure. Yeah, could
16 you give us the copy of the document? And I
17 believe you said, during the break, that there
18 were three. Is it just the one --

19 MS. BAUGHMAN: It's just the one.

20 MS. HORAN: -- or were there three?

21 MS. BAUGHMAN: It's just the one, but
22 the one has different parts to it, if that makes
23 sense. Like --

24 MS. HORAN: Well, I'll look at it.

25 MS. BAUGHMAN: You'll see. It's one.

1 MS. HORAN: Okay.

2 Q (BY MS. HORAN) Welcome back, Dr.
3 Sabatini.

4 A Thank you. Hope you had a good lunch.

5 Q I hope you did as well.

6 A Thank you. Stella Nova. One of my
7 family's favorites.

8 Q Yeah. Good for you.

9 Have -- you understand you're still
10 under oath to tell the truth?

11 A Yes.

12 Q Okay. And when we left right before the
13 break, we were talking about how one could go
14 about measuring the spiractor fall pipe while the
15 spiractor is being used. So while there's water
16 in it. And I -- do you have any new or --
17 thoughts on how one would go about doing that?

18 A Not beyond what we discussed before and
19 not -- not beyond that. No.

20 Q Okay. And you've never measured a
21 spiractor while it's filled or unfilled.

22 Is that fair?

23 A No.

24 Q No, you have never done it?

25 A I have not done that.

1 Q Okay. Did AHE or you measure the
2 relative elevation between the recarbonation
3 basin water level and the effluent pipe rim
4 level?

5 A I can't speak for AH. I assume that
6 they did a thorough analysis of all the systems
7 as they document at the beginning of their
8 report. That they studied all basins and all
9 plans and schematics and everything. So I can't
10 speak to what they did. But I did not.

11 Q Turning to your report which was marked
12 as Exhibit 2, if we turn to Page 9 -- I'll let
13 you get there. Table 5.2. In Table 5.2, you
14 compare AH Environmental and Dr. Hennes's loss
15 calculations.

16 Fair?

17 A I compare AH Environmental's corrected
18 numbers based upon the transposed exponent that
19 Hennes noted. So yes, it's AH's numbers versus
20 Hennes's numbers, but AH's corrected numbers.

21 Q Thank you for that clarification.

22 And then you adopt AH's clarified
23 numbers for your own calculations.

24 Fair?

25 A Adopt the 1-foot fall height which leads

1 to the same -- same numbers.

2 Q Sure.

3 So you used the numbers in Table 5.2
4 that are attributed to AH Environmental for
5 your calculation --

6 A Those are actually my -- sorry. Pause
7 before I answer.

8 MS. BAUGHMAN: Wait until she finishes,
9 and pause and answer.

10 THE WITNESS: Count to three. One, two,
11 three.

12 I -- I adopted my corrected -- the
13 number's actually my calculations based upon AH's
14 1-foot fall height.

15 Q (BY MS. HORAN) Okay. And using a
16 2-foot -- as opposed to a 1-foot -- fall height
17 nearly doubles the losses; correct?

18 A It has -- approaching that effect.

19 Q Turning to -- back to the AH
20 Environmental report in Figure 5 -- 4.2 which is
21 on Page 4-3.

22 A Okay.

23 Q Do you see that Figure 4.2 shows a -- a
24 nappe?

25 A Yes.

1 Q And did you see Figure 4.3 right below
2 it has a more regular water sheet?

3 MS. BAUGHMAN: Objection to form.

4 THE WITNESS: Yes. Non-constricted.

5 Q (BY MS. HORAN) And did you notice that
6 the Hadnot Point effluent pipe has a heavy crust
7 deposit compared to the none or less deposit on
8 the Holcomb Boulevard pipe?

9 MS. BAUGHMAN: Objection to form.

10 THE WITNESS: Ask again.

11 Q (BY MS. HORAN) Did you notice that the
12 -- there's a heavier crust deposit for the Hadnot
13 Point effluent pipe -- which is Figure 4.42 --
14 compared to the no or less deposit in the Holcomb
15 Boulevard pipe which is 4-3?

16 MS. BAUGHMAN: Objection. Form and
17 foundation.

18 THE WITNESS: Yeah, I wouldn't be able
19 to make that discernment based upon this picture.

20 Q (BY MS. HORAN) Could a crust on a
21 effluent pipe be responsible for the nappe?

22 MS. BAUGHMAN: Objection to form.

23 THE WITNESS: I would refer back to
24 Figure 4-1. Which doesn't have -- show the same
25 nappe. And AH attributes the difference between

1 4-1 and 4-2 to the backwashing of the filters.

2 Q (BY MS. HORAN) So let's turn back to
3 that. On 4-2, in the -- the text above it on
4 Page 4-2.

5 A Oh, on Page 4-2. I was on Figure 4-2.
6 Okay.

7 Q Yep.

8 The text above it, there's a sentence
9 that reads, "Only a small vortex formed over the
10 submerged effluent pipe, Figure 4-1, on the one
11 spiractor, and then developed a nappe after a
12 backwash filter went back online, Figure 4-2."

13 Do you see that?

14 A Yes.

15 Q Okay. Is it your understanding that for
16 Figure 4-1 was when the backwash water was being
17 filtered through the effluent pipe?

18 A No.

19 Q What is your understanding?

20 A I know that when the backwash filter --
21 when a filter's being backwashed, more water is
22 forced through fewer systems. And so that -- you
23 get a backup of water, a constriction, as they
24 described. And so it's clear to me the
25 difference between 4-1 and 4-2 is the

1 constriction due to the hydraulics of the filter
2 being backwashed resulting in the nappe, Figure
3 4-2.

4 Q So it's your opinion that the nappe is
5 from the backwashed water --

6 A That the --

7 Q -- and the vortex is when there's no
8 backwash water.

9 MS. BAUGHMAN: Objection to form.

10 THE WITNESS: When -- in the absence of
11 the backwash constriction.

12 Q (BY MS. HORAN) So turning back to 4-2,
13 the language where it says -- the second half of
14 the sentence I previously read, "And then
15 developed a nappe after a backwashed filter went
16 back online."

17 Doesn't that suggest to you that the
18 nappe was formed after the backwashed filter was
19 back on?

20 A Yeah, I don't understand that wording.
21 I would -- so Figure 4-1, the way I interpreted
22 it, was at the end of the backwash process, just
23 as they were putting it back online, that's when
24 they would have had the greatest impact of a
25 backwashed filter on the hydraulics. And so that

1 -- that's when you'd get the maximum hydraulic
2 impact. So from a hydraulics perspective, that's
3 how I would interpret that sentence.

4 Q So why would there be more constriction
5 when there's not backwashing?

6 MS. BAUGHMAN: Objection to form.

7 THE WITNESS: Now, my comment would be
8 that there would be more constriction when there
9 was a filter being backwashed.

10 Q (BY MS. HORAN) And more constriction
11 would be the development of a vortex; correct?

12 A No. No. You would have more -- it
13 would be harder for the water to go through the
14 pipe so you would get more backup of the water in
15 the pipe, and you'd have this scenario, 4-2,
16 versus the scenario in 4-1.

17 Q When you say more "water in the pipe,"
18 do you mean the -- which part -- part of the pipe
19 are you referencing there?

20 A The pipes flowing between the basins.

21 Q So when the spiractor has more water in
22 it. Or are you talking about the effluent pipe?

23 A Right. Because one filter's offline.
24 All the water's having to go through the other
25 filters creating a constriction and a build-up of

1 water prior to that point.

2 Q Okay.

3 A For me, looking at this picture, Figure
4 4-1 to 4-3 tells, to me, a big story. In that
5 obviously, you have less free fall of water in
6 the Hadnot Point effluent pipe than you have in
7 the Holcomb Boulevard.

8 Q So just looking at the two, though, of
9 Hadnot Point, one has a -- Figure 1 is shown as
10 having a vortex in the description and Figure 4-2
11 is it shown as having a nappe in the -- in the
12 description.

13 Do you agree with that?

14 A Yes.

15 Q Okay. And it's your opinion that when
16 the backwash filter is back online, there would
17 be a vortex and not a nappe.

18 MS. BAUGHMAN: Objection to form.

19 THE WITNESS: I couldn't speak to the
20 vortex -- to the nap. But what I -- what is
21 clear to me is that there's less free fall in the
22 4-2 than the 4-1, and there's less free fall in
23 4-1 than in 4 -- Figure 4-3.

24 Q (BY MS. HORAN) Sure.

25 But what is your understanding of the

1 process as it relates to the backwash filter,
2 whether it was on or off, or how it was being
3 used, for Figure 4-1?

4 A My understanding is, at the end of the
5 backwash cycle, they have the greatest impact on
6 the effluent pipe from the spiractor. And when
7 that backwash filter was brought back online, the
8 hydraulics changed back to the previous
9 condition.

10 Q Why would you have less free fall when
11 the water is less backed up in the spiractor
12 effluent pipe?

13 MS. BAUGHMAN: Objection to form.

14 THE WITNESS: Say again.

15 Q (BY MS. HORAN) Why would you have less
16 free fall when the water is less backed up in the
17 spiractor effluent pipe?

18 A No. What I was saying, there would be
19 more water backed up. And so the -- you would
20 have less free fall because there was more water
21 being backed up.

22 Q And when there's -- is it your opinion
23 that Figure 4-1 shows more or less free fall than
24 Figure 4-2?

25 A My impression would be more. Just based

1 on visual observation.

2 Q So just so I understood that correctly,
3 your opinion is that 4-1 shows more free fall
4 than Figure 4-2? Or did I get that wrong?

5 A That would be my visual observation.

6 Q Okay. Turning to Page 3-11 of the AH
7 Environmental report.

8 Dr. Sabatini, do you remember earlier
9 this morning, we talked about mixing in the
10 reservoirs?

11 A (Nods head.)

12 Q The first full paragraph on 3-11. Do
13 you see it reads, "In a quiescent tank, e.g., raw
14 and finished water reservoirs, filter beds, and
15 spiractors, the water is assumed to be well
16 mixed, and the bulk concentration of a
17 contaminant is equal to the effluent
18 concentration and can be estimated from a
19 material balance. VOC volatilization is a
20 first-order rate process and the remaining
21 fraction of a chemical can be expressed as
22 follows." And then it has an equation.

23 Do you see that?

24 A Yes.

25 Q Do you see that AH Environmental assumed

1 that the reservoirs would be well mixed?

2 A It depends upon what you mean by "well
3 mixed." Certainly, the spiractor, I would agree,
4 was extremely well mixed because of all the flow
5 coming in. The reservoirs -- as the water comes
6 into that reservoir, you have a certain amount of
7 energy that causes that flow to go into the
8 reservoir. So you could get a degree of mixing
9 from that. Which would be, I might choose to say
10 mix -- a degree of mixing as opposed to well
11 mixed. To me, well mixed, from a reactor design
12 perspective, means you have some kind of a
13 turbine or something mixing the water to get it
14 well mixed.

15 So I can imagine that what they're
16 trying to say is that the water coming in creates
17 a degree of mixing. But I probably wouldn't
18 choose to use the term "well mixed."

19 Q And that's because you would only use
20 the term "well mixed" if there was some kind of
21 mechanical process involved?

22 A Yes. Mechanical or -- you can achieve
23 it in different ways, but not just water flowing
24 into a -- a basin. And part of that assumption
25 makes the calculations easier.

1 Q Could you turn back to Figure 4-2?
2 Which is Page 4-3.

3 A (Witness complies.)

4 Q Would you agree that Figure 4-2 which
5 shows the development of a nappe, that the -- it
6 would imply -- or strike that.

7 Would you agree that Figure 4-2 which
8 shows a nappe -- a nappe would imply more surface
9 area for water-to-air contact?

10 A Say that again.

11 Q Sure.

12 Do you see 4-2 creates a nappe?

13 A Yes. I...

14 Q Okay. And would you agree that a nappe
15 will create more surface area for water-to-air
16 contact?

17 A That's a hypothetical question.

18 Q Why is that a hypothetical question, Dr.
19 Sabatini?

20 A Well, visually, you may see more area
21 towards the top of the pipe, but there's less
22 free fall which has area associated with it as
23 well. So it would be harder for me to
24 definitively say what the combined impact would
25 be.

1 Q I'm -- so I'm not asking about the
2 combined impact. I'm just asking about the --
3 the nappe creation.

4 A Well --

5 Q At the top of the pipe, would that
6 create additional surface-to-air contact with
7 water?

8 MS. BAUGHMAN: Objection to the form.

9 THE WITNESS: I'd have to study that
10 more.

11 Q (BY MS. HORAN) You said you couldn't
12 make an overall assessment because the fall
13 height might be lower because the pipe would be
14 more full.

15 Why would a -- the creation of a nappe
16 mean that the pipe was more full?

17 A I would --

18 MS. BAUGHMAN: Objection to form.

19 THE WITNESS: I would attribute that to
20 the -- again, to the downstream constriction
21 causing the -- causing that condition.

22 Q (BY MS. HORAN) Okay. Turning next to
23 storage tanks, you agree with Dr. Hennet's use of
24 the approach laid out in Thomas, 1990 as opposed
25 to the approach used by AH Environmental;

1 correct?

2 A The same that AH Environmental used and
3 Hennet used, yes. I...

4 Q And you --

5 MS. BAUGHMAN: Well, I'm going to object
6 to the form and object as non-responsive. I
7 don't think he heard the question.

8 THE WITNESS: Oh, I'm sorry.

9 MS. BAUGHMAN: Because he answered
10 something different from what you asked.

11 THE WITNESS: Can you rephrase the
12 question?

13 Q (BY MS. HORAN) I thought you answered
14 it, but I will ask it again.

15 You agree with Dr. Hennet's use of the
16 more generalized approach laid out in Thomas,
17 1990 as opposed to the approach that was used by
18 AH Environmental; correct?

19 MS. BAUGHMAN: Object to the form.

20 THE WITNESS: Yeah, I'd have to go back
21 and refresh my memory on the terminology.

22 Q (BY MS. HORAN) Okay. Could you turn to
23 Page 10 of your report?

24 A (Witness complies.)

25 Q The second paragraph suggests that --

1 A Yeah. That's what I --

2 MS. BAUGHMAN: Wait. Wait. Wait.

3 THE WITNESS: I'm sorry.

4 MS. BAUGHMAN: Let her finish.

5 THE WITNESS: Sure. I'm sorry.

6 Q (BY MS. HORAN) -- suggests that AH
7 Environmental used the Southworth approach, and
8 you did not agree that that was the appropriate
9 approach. You agreed rather with Dr. Hennet that
10 their more generalized approach was better.

11 Correct?

12 A Yes.

13 Q Okay. On that same page, the first
14 sentence of the second full paragraph says, "The
15 approaches outlined in Thomas, 1990 are for
16 systems open to the atmosphere, e.g., a pond,
17 lake, or river. In contrast, the Camp Lejeune
18 water treatment tanks, from raw water to clear
19 well to water towers, are covered. They are not
20 open to the atmosphere."

21 Did I read that correctly?

22 A That's correct.

23 Q Is it your opinion -- or strike that.

24 Dr. Sabatini, you agree that the water
25 treatment tanks, from raw water to clear well to

1 water towers, would experience air exchange
2 through venting?

3 A As the water level goes up and down,
4 there would be atmospheric air. As water level
5 goes down, then atmospheric air would replace
6 that amount of water that went down. Yes.

7 So in terms of my terminology, what I
8 meant by open to the atmosphere was completely
9 open, like a lake, versus a cover that has small
10 inter -- or has intermittent vents that's not
11 completely open.

12 Q But you would agree that the water
13 treatment tanks have some ability to interact
14 with the open atmosphere through these vents.

15 Fair?

16 A There is a degree of interaction with
17 the atmosphere.

18 Q Had you seen any photos of the treatment
19 tanks at Camp Lejeune prior to submitting your
20 expert report?

21 A I relied upon the AH Environmental
22 documents. I'm trying to remember if I had or
23 not. I don't recall.

24 Q How did you determine that the Camp
25 Lejeune water treatment tanks were not open to

1 the atmosphere?

2 A That was my impression from the
3 information I had at hand.

4 Q Anything in particular?

5 A Well, for one thing, I've never known
6 them to be open to the atmosphere. That's just
7 allowing for surface contamination of your water.

8 Q Do you know whether there are any drying
9 beds at Camp Lejeune?

10 A I'm sorry. Whether there are...

11 Q Drying beds.

12 A No, I don't.

13 Q Prior to issuing your report, did you do
14 anything to try to find out whether there were
15 drying beds at Camp Lejeune?

16 A That wasn't critical to my calculations.

17 Q And why wasn't that critical to your
18 calculations?

19 A It didn't bear in to the losses of
20 concern.

21 And I might just add to that. I didn't
22 find such information in Hennessey's report either.

23 (Government Exhibit 8 marked for identification)

24 Q (BY MS. HORAN) So I'm marking as
25 Government Exhibit 8 -- this is a document, EPA

1 Region 8 Drinking Water Tech Tips.

2 Dr. Sabatini, have you seen this
3 document before?

4 A It doesn't look familiar.

5 MS. BAUGHMAN: Do you have the date, by
6 the way? It doesn't --

7 MS. HORAN: No. I don't have a date.

8 MS. BAUGHMAN: Okay.

9 Q (BY MS. HORAN) Do you see the paragraph
10 at the top that starts "Finished water storage
11 sanitary protection"?

12 MS. BAUGHMAN: I'm going to -- you can
13 take your time and read the document, if you've
14 never seen it before, before you answer
15 questions.

16 THE WITNESS: (Reviews document.)

17 Okay.

18 Q (BY MS. HORAN) Do you see the paragraph
19 at the top of the document? The first full
20 paragraph? The second sentence reads -- or did
21 you have a chance to read that whole paragraph?

22 A Yes.

23 Q Do you disagree with anything in that
24 paragraph?

25 MS. BAUGHMAN: Objection to form.

1 THE WITNESS: Not in my general -- do
2 you have a specific question about the paragraph?

3 Q (BY MS. HORAN) That was my question.
4 When you read it, was there anything that you
5 disagreed with?

6 MS. BAUGHMAN: Object to the form.
7 You can carefully read the whole thing
8 before you answer.

9 MS. HORAN: Laura, I'd like him to --

10 MS. BAUGHMAN: He -- this is his first
11 deposition.

12 MS. HORAN: I know. And I --

13 Q (BY MS. HORAN) I'm not pushing you, Dr.
14 Sabatini --

15 A Yeah.

16 Q -- on any document all day.

17 A Yeah, I just read it quickly --

18 Q Sure.

19 A -- not realizing you were...

20 Q Yeah. Take your time.

21 A (Reviews document.)

22 Okay. In this first reading, it all
23 seems appropriate.

24 Q Okay. Do you see the second sentence
25 reads, "The air pressure inside of a tank is

1 always trying to equalize with the air pressure
2 outside as the water level rises and falls in the
3 tank"?

4 Do you see that?

5 A Yes.

6 Q Do you agree with that?

7 A Yes.

8 Q Okay. You can put that aside.

9 A By the way, this reminds me back to the
10 water buffalo and the vent.

11 Q Sure.

12 A It would seem somewhat analogous. You
13 have a small vent pipe on a big surface area
14 water tank to help equalize pressures.

15 Q Sure.

16 A In the same way that you have here.

17 Q An air exchange would happen in the same
18 way.

19 A Through the same way.

20 Q Through the vent; correct?

21 A Yeah. In -- as water level rises and
22 falls. Not forced ventilation.

23 Allergies. I don't know if you can hear
24 it in my voice. I can.

25 Q If you need a break, let us know.

1 A A lozenge.

2 MS. O'LEARY: Just also, there's some
3 water if you'd like.

4 THE WITNESS: Thank you. Very kind.
5 Thank you.

6 MS. BAUGHMAN: This is yours, too, if
7 you need it.

8 Q (BY MS. HORAN) You would agree that
9 fluctuation will occur every day in both the
10 water reservoirs and the towers; correct?

11 MS. BAUGHMAN: Objection to form.

12 THE WITNESS: Under normal course of
13 operation, you would expect that. Although, that
14 one CLW showed there were days -- hours and days
15 where there were minimal fluctuation in a water
16 reservoir.

17 Q (BY MS. HORAN) What CLW are you
18 referencing?

19 A Well, I don't have that with me right
20 now, but it was...

21 Q Could you just describe the document, to
22 the best of your recollection?

23 A Yeah. It was a document that showed
24 every four-hour water elevations in a storage
25 tank over the course of, I think, seven or eight

1 days. And so it showed the water level
2 fluctuations. It varied from zero to 2 feet
3 maximum over the seven to eight days. And the
4 average water fluctuation was 1 foot.

5 Q And where did you first see that
6 document or -- strike that.

7 When did you first see that document?

8 A I don't recall exactly.

9 Q Do you recall if it was before or after
10 you submitted your expert report?

11 A I believe before. Yes. I believe
12 before.

13 Q Do you know if you cite that document in
14 your report?

15 A Not sure if I did or not. I don't see
16 it listed.

17 Q So I guess based on this document, is it
18 your understanding that the fluctuation is, on
19 average, 1 foot per day in the Camp Lejeune
20 reservoirs? Or did I misunderstand that?

21 A In this one set of data that they
22 collected, that was the case.

23 Q Do you recall when the data was from?

24 A '85.

25 Q '85?

1 A Yeah. It's what I recall.

2 Q And was the data from a reservoir or
3 water tower? Both?

4 A Reservoir is what I recall. Yeah,
5 reservoir.

6 Q How much fluctuation is there per day at
7 a Camp Lejeune water tower, if you know?

8 A I don't recall.

9 Q The -- I understand -- or strike that.
10 You're -- what you've told me today that
11 there -- it's your understanding that there's
12 1-foot fluctuations in the Camp Lejeune water
13 reservoirs.

14 How does that impact your opinions, as
15 to reservoirs, in your report?

16 A In my analysis, I assumed that there
17 would be some fluctuation. I guess that's the
18 answer. I assumed. So I took that into account.
19 There would be a certain level of water
20 fluctuation.

21 Q Sure.

22 And would it matter if it was 1 foot or
23 2 feet of fluctuation for your opinion?

24 A Not -- not -- no.

25 Q So the amount of fluctuation is not a

1 pertinent -- or the quantification of the amount
2 of fluctuation is not a pertinent factor, to your
3 opinion, as to reservoirs?

4 A Not in that range that you just
5 mentioned. Now, if the tank emptied and went
6 from empty to full, the magnitude of the
7 fluctuation could make a difference. But the
8 other big difference is -- well, I'll stop there.
9 That answers your question.

10 Q How about -- would -- would a 3-foot
11 fluctuation make an impact to your opinion?

12 A I'd say no. Because there's other
13 factors that go into it.

14 Q A moment ago, you said, well, the other
15 big factor is, but I'll stop there.

16 What is the other big difference that
17 you were alluding to?

18 MS. BAUGHMAN: Objection to form.

19 THE WITNESS: The Thomas method, lake
20 opened to the atmosphere, you have air movement
21 over the surface. And that increases the
22 volatilization rate where as in a covered tank,
23 even vented, you don't have air flowing over the
24 surface like you would in a -- in a lake. And so
25 that's another factor that goes into the

1 volatiliziation rate in the Thomas method.

2 Q (BY MS. HORAN) Sure.

3 Do you know how many times per day the
4 water levels change at Camp Lejeune in the
5 reservoirs?

6 MS. BAUGHMAN: Objection to form.

7 THE WITNESS: The CLW I referred to
8 provided some every-four-hour information, as I
9 recall, in the '85 timeframe. It gives some
10 indication of that.

11 Q (BY MS. HORAN) Do you know how fast the
12 water is flowing in the reservoirs or in the
13 water tanks?

14 A I don't know that number off the top of
15 my head. It's something I could calculate, but I
16 don't know that number off the top of my head.

17 Q Did you calculate it for your opinions?

18 A No.

19 Q And why not?

20 A Because it's not part of the -- the
21 Thomas method takes detention time into
22 consideration.

23 Q So instead of determining the flow rate,
24 you determined detention time?

25 A That was what -- that's what feeds into

1 the...

2 Q Do you know how much water flows through
3 a Camp Lejeune water reservoir per day?

4 A I can refer to my report. Or actually,
5 I guess AH Environmental. So it's in the report.

6 Q In the AH Environmental report?

7 A Yes.

8 Q We've talked about mixing in the
9 reservoirs. Did you take mixing in the
10 reservoirs into account when you were doing your
11 calculations for the water reservoirs?

12 MS. BAUGHMAN: Objection to form.
13 Foundation.

14 THE WITNESS: The Thomas method assumes
15 completely mixed systems. So to that -- yes, I
16 did.

17 Q (BY MS. HORAN) Could you identify
18 where, in your report, you address the reservoir
19 depth fluctuations? Are they in your report?

20 A No.

21 Q No. Okay.

22 The flow -- as the water flows through
23 the reservoirs and tanks, would it induce
24 turbulence in the water?

25 A As it flows through the reservoir, no.

1 There might be -- no. As it flows through the
2 reservoir.

3 Q How do you know there would be no
4 turbulence?

5 A As the water enters the reservoir, there
6 may be a little splashing. But just the nature
7 of the reservoir is such that you wouldn't --
8 from a hydraulics perspective, you wouldn't see
9 turbulence.

10 Q You say, "The Nature of the reservoir."
11 What do you mean by that?

12 A Just the tension time. The dimensions
13 of the basin. Just from a reactor engineering
14 perspective.

15 Q Have you ever observed the water flow
16 through a water reservoir?

17 A No. I have not. But I've done
18 hydraulic analyses of such basins.

19 Q What do you mean by you've done
20 hydraulic analyses of such --

21 A Well, that's part of hydraulic -- of
22 the --

23 MS. BAUGHMAN: Wait. Wait. Let her
24 finish.

25 THE WITNESS: Sorry. Sorry.

1 MS. BAUGHMAN: Go ahead and ask again.
2 I don't know if it's on the record.

3 Q (BY MS. HORAN) What do you mean by such
4 -- hydraulic analyses of such basins?

5 A It's part of what you do in design of
6 treatment plants is, you do reactor engineering
7 analyses. Hydraulic analyses.

8 Q Have you ever designed a water treatment
9 plant?

10 A Yes. Based on -- I teach classes on
11 design of water treatment plants.

12 Q And what class is that?

13 A Physical chemical processes for water
14 treatment.

15 Q Do you still teach that class today?

16 A As an emeritus professor, I no longer
17 teach that class. So I last taught it -- well, I
18 no longer teach that class.

19 Q When did you last teach it, Dr.
20 Sabatini?

21 A Just before I retired. So three years
22 ago.

23 Q And was that a class that you taught
24 every semester?

25 A Say again.

1 Q Did you teach that every semester?

2 A Every year. Every year or every other
3 year.

4 Q And other than teaching a class, have
5 you ever designed a water treatment plant that
6 was built?

7 A Not as a practicing consulting engineer.
8 I've consulted with former students who were
9 designing water treatment plants. But not
10 myself. I understand all the basic principles.

11 MS. BAUGHMAN: Would you mind if we take
12 a quick break?

13 MS. HORAN: Not at all.

14 MS. BAUGHMAN: Thank you.

15 MS. HORAN: We can go off the record.

16 THE VIDEOGRAPHER: Off the record. 1:59
17 p.m.

18 (Short break from 1:59 p.m. to 2:06 p.m.)

19 THE VIDEOGRAPHER: We're back on the
20 record at 2:06 p.m.

21 Q (BY MS. HORAN) Dr. Sabatini, I believe
22 you mentioned that your water storage tank
23 calculations took into account some depth
24 fluctuations of the reservoirs.

25 A Say again. Some...

1 Q Sure.

2 I believe you said earlier that your
3 calculations as -- under storage tanks took in
4 some reservoir depth fluctuations.

5 A I assumed that that was the case when I
6 went through my calculations.

7 Q And how did you take those into account
8 in your calculation?

9 A I just assumed that that was the case
10 that -- that's implicit in the Thomas method, was
11 that there's air for volatilization to occur
12 into.

13 Q I'm marking as Exhibit 9. This is
14 Volatilization from Water, by Richard G. Thomas.
15 (Government Exhibit 9 marked for identification)

16 Q (BY MS. HORAN) Dr. Sabatini, do you
17 recognize this as the document you've been
18 referencing as Thomas today?

19 A Yes. Appears to be the same document.
20 Yes.

21 Q Great.

22 So you've seen this before?

23 A Yes.

24 Q Okay. Could you turn to 15-4?

25 A Okay. (Witness complies.)

1 Q The first full paragraph, the third
2 sentence reads, "In the atmosphere, vertical
3 diffusion is usually more rapid than in the water
4 and chemicals are transported from the interface
5 quickly."

6 Do you see that?

7 A Yes.

8 Q Do you agree?

9 A I agree that molecules diffuse faster in
10 the air than in water. Yes.

11 Q So that means that once VOCs volatilize
12 out of the water, they'll diffuse upwards
13 quickly. Fair?

14 A Depends upon what you mean by quickly.
15 That's where the two-film transfer equation comes
16 in, in terms of mass transfer across that
17 interface.

18 Q They'll diffuse more quickly than if
19 they were in the water.

20 Is that fair?

21 A Yes. They -- molecules diffuse more
22 quickly in air than in water.

23 Q And that will cause the concentration
24 gradient at the water air surface to stay higher
25 than if the VOCs did not quickly diffuse upwards.

1 Fair?

2 MS. BAUGHMAN: Objection to form.

3 THE WITNESS: In the general principle,
4 yes. That's fair.

5 Q (BY MS. HORAN) And that will cause the
6 rate of volatilization to be faster than it would
7 be if the VOCs did not quickly diffuse upwards;
8 correct?

9 MS. BAUGHMAN: Objection to form.

10 THE WITNESS: The questions seem to be
11 hitting on fairly fundamental concepts. But yes.

12 Q (BY MS. HORAN) And because that
13 gradient is the delta C in the two-film mass
14 transfer equation in your report which is the
15 equation 3-3 I believe you just referenced, and
16 when the delta C increases, the rate of mass
17 transfer J will also increase; correct?

18 A Say that again. As the delta...

19 Q Sure. And if you would like to open
20 your report to look at the equation, that would
21 be fine, too. It's equation 3-3 in your report.

22 A Sure. Yeah. Thank you. Very familiar
23 with that equation.

24 Q Do you have it in front of you?

25 A Yes.

1 Q Okay. Because the gradient is the delta
2 C in the two-film mass transfer equation in your
3 report which you have in front of you and when
4 delta C increases, the rate of mass transfer
5 which is J will also increase; correct?

6 A Yes. Correct.

7 Q Okay. Turning back to Exhibit 9 which
8 is the Thomas study, could you turn to Page
9 15-20?

10 A (Witness complies.)

11 Q You relied on table 15-3 to determine
12 that .0046 is the proper oxygen reaeration
13 coefficient for ponds; correct?

14 A Yes.

15 Q And you agree with Dr. Hennet that ponds
16 are the proper example to use.

17 MS. BAUGHMAN: Objection to form.

18 THE WITNESS: Yes.

19 Q (BY MS. HORAN) Was that yes?

20 A Yes.

21 Q How did you reach that determination?

22 A Between the alternatives -- lake, river,
23 and pond -- pond is most appropriate.

24 Q And why was the pond the most
25 appropriate?

1 A More similar -- in this range of
2 options, it's more similar to the reservoir
3 situation.

4 Q In what way?

5 A Size.

6 Q Anything besides size?

7 A Size would be surface area.

8 Q That's it?

9 A Yes.

10 Q Okay. And you used the .0046 oxygen re
11 -- reaeration coefficient to reduce Dr. Hennet's
12 calculations of volatilization by about 58
13 percent. Fair?

14 And again, you're welcome to look back
15 at your report.

16 A Reduce them 2 -- 2.58 times his
17 estimates. Yes.

18 Q And you agree that Thomas, 1990, the
19 literature values for oxygen reaeration
20 coefficients for ponds is between .0046 and
21 .0096.

22 Do you see that?

23 A Literature values?

24 Q Yes.

25 A Yes.

1 Q So you use the lowest literature value
2 for ponds possible. Fair?

3 A Fair.

4 Q And ponds don't have flowing water. Is
5 that fair?

6 A Generally, no. They may. But generally
7 not.

8 Q And flower -- flowing water causes
9 greater reaeration; correct?

10 A Correct.

11 Q And that's why in Table 15-3, the values
12 for rivers are up to two orders of magnitudes
13 greater than ponds. Fair?

14 A Fair.

15 Q And you agree that water storage tanks
16 do experience some water flow; correct?

17 MS. BAUGHMAN: Objection to form.

18 THE WITNESS: I would say more in the
19 mode of pond than river certainly.

20 Q (BY MS. HORAN) But they do experience
21 water flow. Fair?

22 MS. BAUGHMAN: Objection to form.

23 THE WITNESS: Well, depends upon what
24 you mean by flow. It's -- I mean there is some
25 minor movement across the -- the tank. So yes.

1 Q (BY MS. HORAN) Well, every day, a water
2 storage tank or reservoir has water coming in and
3 water going out.

4 A That's true.

5 Q Fair?

6 A Correct.

7 Q So every day, there's new water that
8 appears that flows through the system. Fair?

9 MS. BAUGHMAN: Objection to form.

10 THE WITNESS: Fair.

11 Q (BY MS. HORAN) And ponds don't
12 necessarily have water that flows in and flows
13 out of them on a daily basis leading to
14 fluctuations. Fair?

15 MS. BAUGHMAN: Objection to the form.

16 THE WITNESS: It depends. To a lesser
17 degree than a river or lake certainly.

18 Q (BY MS. HORAN) And how would you
19 compare it to a water reservoir in terms of flow
20 between a pond and a water reservoir?

21 A Probably comparable to more. Probably
22 more.

23 Q The water reservoir has more flow than a
24 pond?

25 A Well, that's hard to say. I need to

1 have more of the parameters.

2 Q What parameters would you need?

3 A Well, what particular pond? What ponds
4 did they use for this study? What were the
5 conditions in that pond? So it would be hard for
6 me to make a general statement.

7 Q Okay. So sitting here today, you don't
8 have an opinion on whether a water reservoir
9 wherein water flows in and out every day has more
10 or less flow than a pond?

11 A In general, I would agree, but I
12 wouldn't want to make that as an overall
13 conclusion in all cases.

14 Q Sure.

15 So there may be exceptions. But
16 generally, you agree.

17 MS. BAUGHMAN: Objection to form.

18 THE WITNESS: Sure. I agree.

19 But I might add, back to your analogy to
20 the river, more than the flowing of the water,
21 it's the ripples and the surface area that's
22 associated with that that would have the impact.

23 Q (BY MS. HORAN) So you're saying it's
24 the ripples in a --

25 A Ripples or waves or undulations that

1 increase the surface area for mass transfer.

2 Q Sure.

3 So can we call that turbulence at the
4 top?

5 MS. BAUGHMAN: Objection to form.

6 THE WITNESS: As a hydraulic person,
7 "turbulence" has a very --

8 Q (BY MS. HORAN) Okay.

9 A -- specific meaning.

10 Q Okay.

11 A Laminar flow. Turbulent flow. So...

12 Q Sure.

13 So what were the terms that you used?
14 Ripple?

15 A I said ripples and waves surface area.

16 Q Do you know whether water that flows
17 through a water reservoir or a water tank, as it
18 comes in and out throughout the day, would create
19 ripples or waves?

20 A That would be extremely hard. No, I
21 would -- I would say not.

22 Q And why would you say no?

23 A Just the nature of the flow system.

24 Q And what about the nature of the flow
25 system leads you to say no?

1 A Just the -- well, laminar turbulent flow
2 conditions. They'd be very much in the laminar
3 flow regime.

4 Q And why is that?

5 A Because of the velocities and the nature
6 of the flow.

7 Q But you've never seen inside a water
8 reservoir to determine whether there are any
9 ripples or waves across the top as it's filled
10 throughout the day.

11 Fair?

12 A I have not. But the engineering
13 calculations suggest as much.

14 Q You would consider a water treatment
15 plant reservoir that can accommodate 5 million
16 gallons of water treatment per day to have a
17 limited flow?

18 A To say -- I'm sorry. Repeat. To...

19 Q You would consider a water treatment
20 plant reservoir that can accommodate 5 million
21 gallons of water treated per day to have a
22 limited water flow?

23 MS. BAUGHMAN: Objection to form.

24 THE WITNESS: Not a limited water flow.
25 Limited water velocity.

1 Q (BY MS. HORAN) What is the difference
2 between water flow and water velocity?

3 A Flow is gallons per day. Volume per
4 time is flow. Velocity is flow divided by area
5 which gives you a velocity of feet per -- feet
6 per second. So if -- if you have a large flow
7 but a large area, you have a smaller velocity.

8 Q Okay. So if -- so you would say that a
9 water reservoir that has 5 million -- can take 5
10 million gallons of water per day would have a low
11 velocity but high flow?

12 MS. BAUGHMAN: Objection to form.

13 Q (BY MS. HORAN) Did I understand that
14 correctly?

15 A Again, you can take the flow and divide
16 it by the area to get the velocity. So if you
17 have a big flow but a big area, your velocity
18 doesn't have to be that great.

19 Q Do you know what the velocity of the
20 water at the Hadnot Point Water Treatment Plant
21 is in the reservoir?

22 A I could calculate it, but I don't know
23 that off the top of my head. But all this -- my
24 discussion of velocity is related to laminar
25 versus turbulent flow conditions. You're asking

1 about turbulence.

2 Q Sure.

3 And you're saying that these are more
4 laminar which is more like a pond. Fair?

5 A Right.

6 Q Okay. And do you know what the area of
7 a Hadnot Point water treatment reservoir is?

8 A It's in the -- it's in their report.

9 Q And without doing the calculations to
10 determine velocity of the flow in and out of the
11 reservoirs, how did you determine that it was
12 more like a pond than a river or a lake?

13 A Just engineering judgment. I mean it's
14 -- I didn't feel -- just my -- I made the same
15 assumption that Hennet did and AH Environmental
16 did. I saw no reason to view it differently from
17 how they viewed it.

18 Q Sure.

19 Except for you and Dr. Hennet disagree
20 on what oxygen reaer- coefficient -- fair? To
21 use.

22 A But for the pond.

23 Q Sure.

24 A We did differ on this discussion.

25 Q So for -- without doing the calculations

1 to determine the velocity, how did you determine
2 that the best oxygen reaeration coefficient was
3 the lowest possible value for a pond?

4 A Because unlike a pond which is open to
5 the atmosphere with a breeze flowing over it, the
6 reservoir has no breeze flowing over it.

7 Q Any other factors that led you to choose
8 the lowest possible oxygen reer- -- reaeration
9 coefficient?

10 A That -- that was the main one. That was
11 the -- that was the reason.

12 Q Did you consider the velocity of the
13 water in any capacity when you were making that
14 determination?

15 A Just as Hennet and AH Environmental, I
16 followed the Thomas approach.

17 Q Sure.

18 But when -- in choosing which
19 coefficient to use in Thomas 1990, you've told me
20 that the -- the largest reason you chose the
21 lowest coefficient was because there was no air
22 flow across the top like a pond. And I'm
23 wondering if you considered at all the velocity
24 of the water traveling in and out of a water
25 treatment reservoir, if that factored into your

1 decision --

2 A It's not a part of -- it's not a part
3 after the Thomas. So...

4 Q So no?

5 A No. Not beyond the context that it's
6 incorporated into the Thomas approach.

7 Q Dr. Hennet, to the best you can recall,
8 did not use the highest available oxygen
9 reaeration coefficient found in the literature
10 for ponds.

11 Fair?

12 A I'd have to look back and remember what
13 value he used.

14 Q And when you were doing your
15 calculations, you took into account that the
16 tanks and water reservoirs are vented; correct?

17 A Correct.

18 A Another -- I'm looking now. He used
19 .008 --

20 Q Uh-huh.

21 A -- which if we're looking at the Thomas
22 method Table 15-3 on Page 15-20, that is the only
23 number and a calculated value. So I also used
24 the literature value. And his calculated value
25 is towards the high end of the literature value

1 range. So in response to your earlier question.

2 Q Sure.

3 And the higher range of the literature
4 value is point point -- excuse me -- .0096.

5 A 96.

6 Q Okay. And Dr. Hennes used .008.

7 A 8.

8 Q Fair?

9 A Fair.

10 Q Okay. So it's lower than the highest
11 value by .0016. Fair?

12 A Fair.

13 Q Okay. Could you turn to 15-8?

14 A (Witness complies.)

15 Q The last paragraph begins, "In view of
16 these observations and the difficulty of
17 performing in-situ volatilization experiments, it
18 is not possible to quantify the error in the
19 calculated values of the volatilization rate
20 constants."

21 Do you see that?

22 MS. BAUGHMAN: I -- you said 15-8 -- 18?

23 MS. HORAN: Uh-huh. 15-8.

24 MS. BAUGHMAN: Oh. I'm on the wrong

25 page.

1 THE WITNESS: Okay. I see the sentence.
2 Yes.

3 Q (BY MS. HORAN) Do you agree?

4 A I have to defer to the document. So I
5 agree that's what the document says.

6 Q In your professional capacity, do you
7 agree with that statement?

8 MS. BAUGHMAN: Objection to form.

9 THE WITNESS: To agree that's their
10 interpretation, I would agree.

11 Q (BY MS. HORAN) The paragraph continues.
12 "The lake example indicates that the error may be
13 as large as a factor of 10, although laboratory
14 data suggests that it could be much less. When
15 one is applying the results of calculations to
16 actual environmental situations, it would
17 probably be advisable to assume that the value --
18 values of volatilization rate may be high by a
19 factor of 10 at most, and low by a smaller factor
20 of possibly three."

21 Do you see that?

22 A Yes.

23 Q And you see that they are discussing an
24 example of a lake?

25 A Yes.

1 Q You see this is based on it not being
2 possible to quantify the error to the calculated
3 values of the volatilization rate constants.

4 So this is about error. Fair?

5 A About...

6 Q Error.

7 A Error in the estimates. Yes.

8 Q "Agree that Thomas is saying that for
9 lakes, losses should be assumed to fall somewhere
10 within a range that is somewhere between three
11 times smaller than the calculated and 10 times
12 bigger than the calculated."

13 MS. BAUGHMAN: Objection to form.

14 THE WITNESS: Says the air may be as
15 large as a factor of 10 in the volatilization
16 rate.

17 Q (BY MS. HORAN) Sure.

18 And then the second sentence says, "When
19 one is applying the results of calculations to
20 actual environmental situations, it would be --
21 it would probably be advisable to assume that the
22 values of volatilization rate may be high by a
23 factor of 10 at most, and low by a smaller factor
24 of possibly three."

25 A So the estimates may be 10 times too

1 high.

2 Q That's your interpretation of that?

3 A Yes.

4 Q So you don't believe that Thomas is
5 saying that for lakes, losses should be assumed
6 to fall somewhere between a range that's three
7 times smaller than calculated or ten times bigger
8 than calculated.

9 MS. BAUGHMAN: Objection to form.

10 THE WITNESS: I -- that's not my
11 interpretation. No.

12 Q (BY MS. HORAN) In your opinion, you
13 applied the lowest pond oxygen reaeration
14 coefficient and assumed, based on a lake example,
15 that the volatilization rate may be overstated by
16 a factor of ten.

17 Fair?

18 MS. BAUGHMAN: Objection to form.

19 Q (BY MS. HORAN) And you're welcome to
20 look at your report.

21 A Say that again.

22 Q In your opinion, you applied the lowest
23 pond aeration -- reaeration coefficient -- let me
24 start over. Strike that.

25 In your opinion, you applied the lowest

1 pond oxygen reaeration coefficient and assumed,
2 based on a lake example, that the volatilization
3 rate may be overstated by a factor of ten.

4 MS. BAUGHMAN: Objection to form.

5 THE WITNESS: Yes.

6 Q (BY MS. HORAN) And you cite Thomas 1990
7 for the premise that Dr. Hennessey's calculations
8 should be further reduced to 10 percent of his
9 calculations.

10 Fair?

11 A Correct.

12 Q Page 11 of your report. The first full
13 paragraph, the second sentence says, "Given the
14 disparity between the covered tanks of Camp
15 Lejeune and the assumption of reservoirs open to
16 the atmosphere in Thomas 1990, the calculation
17 errors would obviously be on the high side."

18 Do you see that?

19 A Yes.

20 Q Thomas is not about reservoirs. Is that
21 -- do you agree?

22 A You're referring to my sentence there.

23 Q Yes. I think it might just be an
24 error --

25 A As a water resource engineer, I would

1 call a lake a reservoir. We often talk about
2 reservoir engineering in terms of lakes and
3 surface bodies. So I'm using the -- I'm using a
4 more general water resource term there to refer
5 to a lake or...

6 So I wasn't implying that it was the
7 same as a tank at the water treatment.

8 Q And you considered that all of the water
9 reservoirs at Camp Lejeune -- and I mean -- when
10 I say "water reservoirs", I'm talking about the
11 -- the water reservoirs in the water treatment
12 plant.

13 A Yes. Thank you.

14 Q Okay. And you took into account that
15 the water reservoirs and the water tanks were
16 vented when you offered your opinion that the
17 volatilization rate was overstated by a factor of
18 ten.

19 Correct?

20 A Yes.

21 Q Turning to your opinion on recarbonation
22 basins. Would use of the recarbonation basin as
23 designed contribute to the loss of VOCs at Camp
24 Lejeune?

25 MS. BAUGHMAN: Objection to form.

1 THE WITNESS: One more time. I'm sorry.

2 Q (BY MS. HORAN) Sure.

3 Would use of the recarbonation basin as
4 designed contribute to the loss of VOCs at Camp
5 Lejeune?

6 A It's possible.

7 Q Why is it possible?

8 A Well, on any of the basins, could
9 possibly open to the atmosphere. Could result in
10 volatilization. The detention time in the
11 recarbonation basin was very low. So that would
12 minimize the opportunity.

13 Q Any other reason?

14 A Not beyond what we've already discussed.

15 Q If the water -- did you do a calculation
16 on what percentage of TCE would have been lost
17 from the water being recarbonated as the
18 recarbonations were designed at Camp Lejeune?

19 A Say again.

20 Q Sure.

21 Did you do a calculation to determine
22 what percentage of TCE would have been lost from
23 the -- if the recarbonation basins were used as
24 designed?

25 A Not a calculation. Hennet assigned zero

1 loss.

2 Q Do you know if the recarbonation basin
3 is open to the atmosphere?

4 A It's my understanding.

5 Q You've referenced Peter Pommerenk a
6 couple times, I think, in this deposition.

7 A The -- yes.

8 Q Who is Peter Pommerenk?

9 A To my knowledge, he's AH Environmental
10 person that was part of the project and part of
11 the expert panel of 2005.

12 Q Outside of your knowledge of his work
13 with Camp Lejeune, are you familiar with any of
14 his other work?

15 A No.

16 Q I'm handing -- or marking as Exhibit 10.
17 This is a document with a Bates
18 00897_PLG_00000066207. And it runs through the
19 Bates 6365.

20 (Government Exhibit 10 marked for identification)

21 Q (BY MS. HORAN) Dr. Sabatini, have you
22 seen this before?

23 A Yes.

24 Q And you recognize this as the expert
25 panel assessing ATSDR's method and analyses from

1 April 29th to the 30th 2009?

2 A Yes.

3 Q Turning to Page 111. And that's just
4 the regular page number. The last paragraph, the
5 sixth line down, it begins, "Where as VOC
6 removal."

7 Do you see that sentence?

8 A Say again. Where...

9 Q So six lines down, there's a sentence
10 that begins, "Where as VOC removal."

11 A Yes.

12 Q Do you see that?

13 A (No response.)

14 Q Okay. So do you see that that reads,
15 "Where as VOC removal from other unit processes
16 at the plant was incidental and probably minor,
17 substantial removal more than 90 percent might
18 have occurred in the recarbonation basin. As
19 with an aeration process, the gas injection
20 creates substantial turbulence and mixing, and
21 can facilitate partitioning and removal of the
22 contaminants from the liquid phase. Therefore,
23 it is recommended that research be conducted to
24 determine when the recarbonation was operated,
25 under what conditions, gas flow rate, et cetera,

1 and what the likely rate of VOC removal was."

2 Did you see that?

3 A Yes.

4 Q So in addition to Dr. Hennet, you also
5 disagree with Dr. Pommerenk that a recarbonation
6 basin can remove a substantial amount of VOCs
7 more than 90 percent.

8 MS. BAUGHMAN: Objection to form.

9 THE WITNESS: Yes.

10 Q (BY MS. HORAN) Do you know whether
11 ATSDR ever followed Dr. Pommerenk's
12 recommendation to research when the recarbonation
13 basin was operated, under what conditions, and a
14 likely rate of VOC removal?

15 A I can't speak to that. I -- I don't
16 know one way or the other.

17 Q You would agree that there's no direct
18 reference to VOC losses at the recarbonation
19 basin in the formula ATSDR used to determine
20 monthly VOC levels at Camp Lejeune?

21 MS. BAUGHMAN: Objection to form and
22 foundation.

23 THE WITNESS: That's a rather sweeping
24 statement. Can you state it again?

25 Q (BY MS. HORAN) Would you agree that

1 there's no direct reference to VOC losses at the
2 recarbonation basin in the formula ATSDR used to
3 determine monthly VOC levels at Camp Lejeune?

4 MS. BAUGHMAN: Objection to form.

5 THE WITNESS: I -- I can't say yes or no
6 to that. I don't know either way. I'm...

7 Q (BY MS. HORAN) Have you seen any
8 documents or anything suggesting one way or the
9 other whether the recarbonation basin was
10 considered or not?

11 MS. BAUGHMAN: Objection. Form,
12 foundation.

13 THE WITNESS: The AH Environmental
14 report.

15 Q (BY MS. HORAN) So, sorry.

16 In the ATSDR formula, have you seen any
17 documents or any information that suggests
18 whether the recarbonation basin was considered or
19 not?

20 MS. BAUGHMAN: Objection. Form;
21 foundation.

22 Can you show him the -- the ATSDR
23 formula you're talk -- I don't know what formula
24 you mean. What are you referring to? Object to
25 the form. Object to foundation.

1 Q (BY MS. HORAN) So I'm -- I'm thinking
2 of the formula that they used to come up with
3 their numbers.

4 Do you know --

5 MS. BAUGHMAN: I don't know where that
6 is.

7 Object to the form. Object to
8 foundation.

9 Q (BY MS. HORAN) Dr. Sabatini, do you
10 know whether ATSDR directly considered the
11 recarbonation basin in determining the monthly
12 VOC levels at Camp Lejeune?

13 MS. BAUGHMAN: Objection, form;
14 objection, foundation.

15 THE WITNESS: No.

16 Q (BY MS. HORAN) Have you ever seen a
17 recarbonation basin that was operating?

18 A Yes.

19 Q Where?

20 A Norman, Oklahoma, to begin with. Many
21 times.

22 Q And is that -- why were you looking at
23 the recarbonation basin in Norman, Oklahoma?

24 A As -- take classes on field trips there.
25 Visit there. It was a part of a -- water

1 treatment studies, et cetera.

2 Q And how large is the recarbonation basin
3 at the Norman, Oklahoma water treatment plant?

4 A I couldn't speak to the dimensions, but
5 the water treatment plant is 10 million gallons
6 per day. So it would be the size of one or two
7 of these tables.

8 Q Thirty feet in length?

9 A Yeah, maybe. Twenty feet. That would
10 be -- I probably shouldn't guesstimate.

11 Q Do you know how much carbon dioxide
12 bubbled into an operating recarbonation basin
13 reaches the surface?

14 A How much it...

15 Q How much of the carbon dioxide bubbled
16 into an operating recarbonation basin reaches the
17 water surface.

18 A No. Not quantitatively. I can see
19 visually.

20 Q And visually, what percentage would you
21 suggest?

22 A Be hard to put a number to that. But
23 again, the goal is for it to dissolve. Some of
24 it makes it to the surface.

25 Q And you, sitting here today, don't have

1 an opinion on what percentage makes it to the
2 surface?

3 A Would be hard-pressed to -- that's in
4 part why I asked...

5 Q Are you looking for the notes from Chris
6 Mattingly? Exhibit 4.

7 A The -- so that really doesn't address
8 how much makes it to the surface. But the ratio
9 is dramatically different from, say, a stripping
10 operation.

11 Q Okay. So sitting here today, you don't
12 have a percentage -- or an opinion on what
13 percentage makes it to the surface --

14 A I wouldn't know -- (simultaneous
15 crosstalk) wouldn't know at this point. No.

16 Q No.

17 You can set aside Exhibit 10.

18 A (Witness complies.)

19 I will say that on the recarbonation, it
20 seemed like there was another issue of just how
21 long it was operated.

22 Q Yeah. Do you know if ATSDR ever looked
23 into how long it was operated for?

24 MS. BAUGHMAN: Objection to form.

25 THE WITNESS: Not -- not to my

1 knowledge.

2 Q (BY MS. HORAN) As part of your expert
3 work in this case, did you ever look into how far
4 -- or how long the recarbonation basin was
5 operated for?

6 A Just studying the reports that were
7 available.

8 Q And what did you find in the reports
9 that were available about whether the
10 recarbonation --

11 A The lack of knowledge -- (simultaneous
12 crosstalk)

13 THE REPORTER: I'm sorry. Start over.

14 Q (BY MS. HORAN) Whether the
15 recarbonation basin was in operation.

16 A Now I've forgotten the question.

17 Q Okay. We'll start from the top.

18 Did you, as part of your work in this
19 case, ever look into whether and how long the
20 recarbonation basins were in operation?

21 A Just looking at the available documents.

22 Q And what available documents are you
23 referencing?

24 A AH Environmental report. Hennes's
25 report.

1 Q And did you find anything about whether
2 the recarbonation basins were in operation?

3 A Just a lack of knowledge.

4 Q You agree that if the recarbonation
5 basin wasn't used, there would have been losses
6 of VOCs at the recarbonation basin; correct?

7 A Possible losses. Yes.

8 Q Would you agree that there were probable
9 losses at the recarbonation basin?

10 MS. BAUGHMAN: Object to the form.

11 THE WITNESS: Speculating. But
12 potential would be greater than just water
13 flowing through the basin.

14 Q (BY MS. HORAN) When you were at the
15 Norman, Oklahoma water treatment plant, could you
16 see bubbles reaching the surface at the
17 recarbonation basin when it was operating?

18 A A limited number. Yes.

19 Q I want to turn next to sorption. Which
20 your opinion on sorption begins on Page 12 of
21 your report, if you'd like to -- to take a look.

22 So when I say "sorption", I'm meaning
23 both adhesion of VOC molecules to material
24 surface and VOC molecules permeating into the
25 bulk of material.

1 Fair?

2 A Say that one more time.

3 Q Sure.

4 A Please.

5 Q When I say "sorption", I mean both
6 adhesion of VOC molecules to material surface and
7 VOC molecules permeating into the bulk of
8 material.

9 Fair?

10 A Fair.

11 Q Does sorption occur at the water
12 treatment plants at Camp Lejeune?

13 A Say again.

14 Q Does sorption occur at the water
15 treatment plants at Camp Lejeune?

16 MS. BAUGHMAN: Objection to form.

17 THE WITNESS: That would be speculation.

18 Q (BY MS. HORAN) You don't know?

19 A I have not quantified it. My
20 professional judgment would be it would be very
21 minor, but I have not -- I -- to my knowledge, no
22 one else has quantified it.

23 Q Is there organic material in the
24 spiractor solids?

25 A The spiractor is designed to remove

1 hardness as a inorganic precipitant.

2 Q Is that a yes or a no?

3 A So that would be the dominant thing
4 present in the spiractor.

5 Q So you agree that there is organic
6 material in the spiractor solids?

7 A I'd be speculating. It's -- I'd be
8 speculating.

9 Q Sitting here today, you don't know one
10 way or the other whether there's organic material
11 in the spiractor solids?

12 MS. BAUGHMAN: Object to the form.

13 THE WITNESS: I guess my statement would
14 be it's predominantly inorganic material. If
15 there were -- happened to be inorganic material,
16 it would be very minor in my estimation.

17 Q (BY MS. HORAN) And what is that based
18 off of? What is that assessment based off of?

19 A That the reason the spiractor there is
20 to remove inorganic materials. Hardness.

21 Q So your experience with other --

22 A Water treatment.

23 Q With water treatment plants.

24 A Yes.

25 Also, I would add to that if it were

1 lake water, there might be more natural organic
2 matter associated with the lake water. Low
3 levels. But since this is groundwater, I'd even
4 expect lower -- I wouldn't -- wouldn't expect
5 there to be organic matter present.

6 Q So it's your opinion that there would
7 not be organic material in the raw water at Camp
8 Lejeune.

9 Am I understanding that?

10 MS. BAUGHMAN: Objection to form.

11 THE WITNESS: Based upon the groundwater
12 source, I would expect it to be very limited to
13 negligible.

14 Q (BY MS. HORAN) If you assume that the
15 spiractor solids contain some organic material,
16 would some TCE sorb to that material?

17 MS. BAUGHMAN: Objection. Form and
18 foundation.

19 THE WITNESS: Yeah, that's very
20 speculative. I'd need to know what kind of
21 organic matter. If it's just humic and fulvic
22 plant decay or is it biochars or -- I would
23 expect not.

24 Q (BY MS. HORAN) You would expect that
25 the TCE would not sorb to the organic material in

1 the spiractor solids?

2 MS. BAUGHMAN: Objection. Form and
3 foundation.

4 THE WITNESS: It's all very speculative.
5 I would expect that if there were inorganic
6 matter present matter, if, it would be minor and
7 -- and not that absorptive for these compounds
8 because of the nature of the organic material.

9 Q (BY MS. HORAN) You mentioned it matters
10 what type of organic material would be in the
11 spiractor, and you listed a few.

12 Would TCE only sorb to some of those or
13 would TCE sorb to all of the organic materials
14 that you listed?

15 A Depends.

16 Q On what?

17 A Well, again, on the nature of the
18 organic material. Could be negligible. Could be
19 minor. Depending upon the nature of the organic
20 material.

21 Q In your PhD, you studied sorption of
22 organic chemicals in a sand aquifer.

23 Fair?

24 A Fair.

25 Q Any sorption taking place there?

1 A Yeah, those are -- yes.

2 Q Is there sorption taking place in the
3 filter beds that have to be backwashed to remove
4 clogging?

5 MS. BAUGHMAN: Objection to form.

6 THE WITNESS: Again, you're removing
7 inorganic materials in the backwashing. Fines
8 that have made it out of the spiractor to the
9 filter beds. So we'd be talking about the same
10 materials. So the same --

11 Q (BY MS. HORAN) So yes?

12 A Same comments from before would apply.

13 Q You mentioned before -- well, strike
14 that.

15 Do you know, or in your studies, have
16 you determined whether TCE sorbs to organic
17 material?

18 A Trying to remember. We looked
19 specifically at TCE. We looked at a number of
20 different compounds. Certainly would have the
21 potential to.

22 Q And I believe you said it would be
23 negligible or minor. Am I remembering that
24 correctly?

25 A Based on the inorganic materials being

1 removed in the spiractor, that would be my
2 expectation.

3 Q Okay. So there would be some sorption
4 of TCE in the inorganic material, and it's your
5 opinion that it would be minor or negligible?

6 MS. BAUGHMAN: Objection to form.

7 THE WITNESS: We're assuming that there
8 is any organic material to begin with.

9 Q (BY MS. HORAN) Yes. I'm asking you to
10 make that assumption.

11 A Which I'm uncomfortable making.

12 Q Why is that?

13 A Well, just I'm not anticipating for
14 groundwater that that would become an issue. But
15 none the less, if somehow, that happened to be
16 the case, you could imagine some potential
17 sorption.

18 The other factor is the timeframe
19 involved. Kinetics of its sorption.

20 Q Why does the timeframe matter?

21 A Because it -- you mentioned if -- if it
22 has to diffuse into the matrix to get to the
23 sorption site, that takes time.

24 Q So why would -- strike that.

25 But how would the time impact whether

1 TCE can sorb to organic material?

2 A It may not have time. Even if there
3 were organic material and even if the TCE did
4 absorb, there may not be sufficient time to
5 achieve the potential sorption.

6 Q Is there any sorption on inorganic
7 surfaces?

8 A The Schwartzbach paper referenced some
9 level of sorption to inorganic materials, but for
10 highly hydrophobic compounds.

11 Q So is that a yes?

12 A There is that possibility.

13 Q Is there any coprecipitation on the
14 mineral that precipitate in the spiractor?

15 A Coprecipitant of...

16 Q On the mineral that precipitate in the
17 spiractors. The VOC.

18 MS. BAUGHMAN: Object to the form.

19 THE WITNESS: VOCs don't precipitate.
20 The minerals would precipitate. So VOCs wouldn't
21 precipitate.

22 Q (BY MS. HORAN) Would there be any
23 coprecipitation on the mineral with the VOC that
24 precipitate in the spiractor?

25 MS. BAUGHMAN: Object to the form.

1 THE WITNESS: Ask that one more time.

2 Q (BY MS. HORAN) Would there be -- do you
3 know if anthracite is part of the sand filter
4 medium?

5 A I'd have to look at the document.

6 Q So sitting here today, you don't know
7 one way or the other?

8 A I don't recall.

9 Q Assuming that there is --

10 A Well, let me -- to that point.

11 Q Sure.

12 A AH says it's a dual filter media.
13 Filter media consisted of 26 inches of sand on
14 top of 18 inches of gravel. So AH says no.

15 Q So you believe there's no anthracite as
16 part of the sand filter medium?

17 A According -- rephrase the question.

18 Q It's your understanding that there's no
19 anthracite as part of the sand filter medium?

20 A That's according to AH.

21 Q Okay. Assuming that there is
22 anthracite, would anthracite sorb some of the
23 TCE?

24 MS. BAUGHMAN: Objection to form and
25 foundation.

1 THE WITNESS: I have to not put on my
2 teacher hat here and talk about the difference
3 between anthracite and activated carbon.

4 Very minimal.

5 Q (BY MS. HORAN) Would VOCs --

6 MS. BAUGHMAN: Wait. Wait.

7 THE WITNESS: Because -- because -- I am
8 going to go into a little bit of my teacher mode.

9 Anthracite is a carbon-based mineral
10 material like activated carbon, but the
11 difference is activated carbon has been activated
12 to give it an extremely high surface area where
13 as anthracite has not been activated. So while
14 it is a carbonaceous material, it would -- has
15 dramatically less, if -- if any absorption, minor
16 relative to activated carbon.

17 It's the explanation I had to give to my
18 chemical engineering colleagues.

19 Q (BY MS. HORAN) So it would be less than
20 if it was active carbon, but there would be some
21 sorption.

22 MS. BAUGHMAN: Objection to form.

23 THE WITNESS: Possibly. Possibly.

24 Q (BY MS. HORAN) Would VOCs coprecipitant
25 with minerals in the spiractor?

1 A I just struggle with the concept of VOCs
2 precipitating. Coprecipitating to me is
3 incorporated into the mineral. Another mineral
4 being incorporated in with a mineral.

5 So based -- based on the way the
6 question is phrased, I'm confused by the
7 question.

8 Q Would VOCs come out of the water with
9 minerals in the spiractor?

10 A One more time. I'm sorry. I keep
11 asking you to repeat, but...

12 Q No. That's okay.

13 A Thank you for your patience.

14 Q No. Thank you for ensuring that you
15 understand the question.

16 Would VOCs come out of the water with
17 minerals in the spiractor?

18 MS. BAUGHMAN: Objection to form and
19 foundation.

20 THE WITNESS: I would not envision them
21 being enmeshed with the precipitant. I would say
22 no.

23 Q (BY MS. HORAN) And why wouldn't you
24 envision it?

25 A Because they're dissolved in solution

1 versus precipitates.

2 Q And when you say dissolved in solution,
3 you mean water?

4 A In water. Yes.

5 Q You state that the backwash water, after
6 settling, may be reused at the plant.

7 Do you recall that?

8 A Yes.

9 Q Do you know if that was the case at the
10 Hadnot Point water treatment plant?

11 A No.

12 I'll say comments in response to
13 Hennessey's suggestions of these items.

14 Q So you don't know if that was the case
15 at the Hadnot Point water treatment plant?

16 A I don't. No.

17 Q So you would agree that that would lower
18 the losses even though there's no data supporting
19 that?

20 MS. BAUGHMAN: Objection to form,
21 foundation.

22 THE WITNESS: Can you ask that again?

23 Q (BY MS. HORAN) Do you agree that
24 bringing this conservative element into your
25 opinion would lower the losses even if there's no

1 data supporting that?

2 MS. BAUGHMAN: Same objections.

3 THE WITNESS: I'm tempted to say that I
4 was responding to a suggestion that had no
5 supporting data.

6 Q (BY MS. HORAN) So you assumed the
7 opposite without any data?

8 MS. BAUGHMAN: Objection to form.

9 THE WITNESS: I would say I was taking a
10 more systematic approach to trying to address the
11 question that was raised by someone else.

12 Q (BY MS. HORAN) So I'm about to switch
13 topics. Are you good to keep going or did you
14 want to take a break?

15 MS. BAUGHMAN: It's up to you.

16 THE WITNESS: Go for a little bit
17 longer.

18 MS. BAUGHMAN: Okay. If you want to
19 keep going. Sure.

20 Q (BY MS. HORAN) Turning to your second
21 opinion which is -- starts on Page 14 of your
22 report.

23 A Have we moved off the first opinion?

24 Q I believe so. Did -- yes.

25 A Because there was one comment I'd like

1 to offer.

2 Part of what reinforced my assessments
3 -- well, it leads into the second opinion so
4 let's go to the second opinion.

5 MS. BAUGHMAN: It's really best if she
6 just asks the questions and you answer.

7 THE WITNESS: Yeah.

8 MS. BAUGHMAN: Okay.

9 THE WITNESS: Let's go to the second
10 opinion.

11 Q (BY MS. HORAN) So the -- the second
12 opinion begins on Page 14 of your report to the
13 extent you're following along.

14 You would agree the ATSDR model does not
15 directly account for VOC losses from the Camp
16 Lejeune water treatment plant; correct?

17 MS. BAUGHMAN: Objection to form.

18 THE WITNESS: I was turning to the page
19 here. I'm sorry.

20 Q (BY MS. HORAN) Sure.

21 You would agree the ATSDR model does not
22 directly account for VOC losses from the Camp
23 Lejeune water treatment plant.

24 MS. BAUGHMAN: Objection to form.

25 THE WITNESS: I would agree that it is

1 indirectly incorporated.

2 Q (BY MS. HORAN) Sure. Not directly.

3 Fair?

4 A I guess not explicitly, but implicitly.

5 Q Have you read Mr. Maslia's rebuttal
6 report?

7 A Ms. --

8 Q Mr. Maslia's rebuttal report.

9 A I'm -- I'm sure I have.

10 Why do you ask?

11 MS. BAUGHMAN: She's going to get to it.

12 Hold on.

13 Q (BY MS. HORAN) I'm marking as Exhibit
14 11. This is Mr. Maslia's rebuttal report.
15 (Government Exhibit 11 marked for identification)

16 THE WITNESS: Okay.

17 Q (BY MS. HORAN) Could you turn to Page
18 31, please?

19 A (Witness complies.)

20 Okay.

21 Q So beginning on Page 27, Mr. Maslia
22 offers a section volatilization of VOCs during
23 the water treatment process.

24 Do you see that?

25 A Yes.

1 Q Okay. And you agree that the ATSDR
2 determined that VOC losses at the water treatment
3 plant were negligible, and therefore, made the
4 decision not to include them.

5 A I'm sorry. I was looking at Page 27.

6 Q Sure. Yeah, if you could just turn to
7 Page 31.

8 A Okay. (Witness complies.)

9 Q Okay. The last sentence of the first
10 full paragraph --

11 A Okay.

12 Q -- reads, "In light of the conclusions
13 of AH Environmental consultants 2004 and the
14 recommendation of its expert panels, ATSDR made
15 the decision to consider any potential VOC losses
16 from storage treatment and distribution as
17 negligible."

18 Did I read that correctly?

19 A Yes.

20 Q Do you know what the ATSDR's decision to
21 consider the losses as negligible meant with
22 respect to the ATSDR model?

23 A What do you mean by that?

24 Q The ATSDR made the decision to consider
25 the losses negligible. Fair?

1 A (Nods head.)

2 Q Do you know what impact that had on the
3 ATSDR model?

4 MS. BAUGHMAN: Objection to form and
5 foundation.

6 THE WITNESS: Well, I guess I would
7 respond to that by virtue of my second opinion,
8 that they did use post-treatment values in their
9 model, finalizing their model.

10 Q (BY MS. HORAN) So you believe that
11 their decision to consider them negligible meant
12 that indirect consideration, as you've explained
13 in your opinion, do.

14 MS. BAUGHMAN: Objection to the form.

15 THE WITNESS: I guess I would say yes,
16 that they consider them implicitly through the
17 use of those data.

18 Q (BY MS. HORAN) Do you know how ATSDR
19 came to the conclusion that these losses were
20 negligible?

21 MS. BAUGHMAN: Objection to form.

22 THE WITNESS: No. My impression is just
23 what's here. That they took this -- I mean this
24 is what I would say is that they took the input
25 of Pommerenk -- if I'm saying his name right --

1 in this expert panel to support their approach.

2 Q (BY MS. HORAN) Do you know what the --
3 well, I might have asked you this before, but I
4 can't quite remember.

5 Do you know what the purpose of the
6 ATSDR water model was?

7 A You did ask that before.

8 MS. BAUGHMAN: Objection. Form and
9 foundation.

10 THE WITNESS: My impression is to get a
11 handle on VOC measurements -- VOC estimates in
12 the drinking water.

13 Q (BY MS. HORAN) Would you agree that if
14 you are trying to determine an individual's
15 actual exposure to contaminants, it would be
16 important to be as accurate as possible?

17 MS. BAUGHMAN: Objection to form.
18 Foundation.

19 THE WITNESS: That's a generic question.
20 Depends upon what you mean by "accuracy".

21 Q (BY MS. HORAN) How would you use
22 accuracy when you're determining an individual's
23 actual exposure to contaminants?

24 MS. BAUGHMAN: Objection to form;
25 foundation; outside the scope.

1 THE WITNESS: There's always uncertainty
2 in data. So accuracy is -- is a challenging
3 thing to achieve. Obviously, you want to be as
4 -- want to do as good a job as you can.

5 Q (BY MS. HORAN) You can set that report
6 aside.

7 A By the way, to your earlier question,
8 have I seen this, yes, I did review this.

9 Q Oh, okay. Great. Thank you for
10 clarifying.

11 If you wanted someone to know what their
12 contaminant exposure was and whether it may have
13 caused an illness, it would be important to be as
14 accurate as possible; correct?

15 MS. BAUGHMAN: Objection. Form and
16 foundation, and outside the scope.

17 THE WITNESS: Thought we kind of asked
18 and answered that question. Certainly want to be
19 as -- do as good a job as you can.

20 Q (BY MS. HORAN) And you wouldn't want to
21 be 5 or 10 percent off. Fair?

22 MS. BAUGHMAN: Objection. Form;
23 foundation; outside the scope.

24 THE WITNESS: I guess that depends, in
25 part, upon how the data is being used. What the

1 epidemiologists and toxicologists need for their
2 side of the assessment.

3 Q (BY MS. HORAN) Is it your opinion that
4 treatment losses were indirectly accounted for
5 because some values of treated water were used in
6 the calibration process?

7 A They were used in the model. Finalizing
8 the model. Yes.

9 Q What do you mean "finalizing the model"?

10 A I'm -- whether it's calibration
11 validation or when it was in the process that
12 they used the data. And that wasn't my focus. I
13 did know that they used it in their -- finalizing
14 their model, however they used it, in that
15 regard.

16 Q And you're not sure if it was
17 calibration or validation. Is that fair?

18 A That was beyond the scope of my expert
19 report. So...

20 Q How did you determine that the data was
21 considered -- well, strike that.

22 A I'll look back at my --

23 MS. BAUGHMAN: She -- she said, "Strike
24 that." That means she's not asking you that.

25 THE WITNESS: Okay.

1 MS. HORAN: So you're good.

2 Q (BY MS. HORAN) Could you please turn to
3 your report, Exhibit 2, on Page 16?

4 A I'm sorry. Which page?

5 Q 16.

6 A (Witness complies.) Yes.

7 Q The last sentence of Section 2 is
8 bolded. It reads, "Thus, for both the Tarawa
9 Terrace and Hadnot Point systems, treated water
10 samples were used in the calibration process" --

11 A Yeah.

12 Q -- "and the ATSDR did consider such
13 losses in the treatment system."

14 A Yeah.

15 Q Did -- did I read that correctly?

16 A Yes.

17 Q So it's your opinion that because the
18 values were used in a calibration process, they
19 were indirectly considered in the ATSDR.

20 A Yes.

21 Q Okay. Is it your opinion that VOC
22 treatment losses were accurately accounted for in
23 the ATSDR model?

24 MS. BAUGHMAN: Objection to form.

25 THE WITNESS: Yes.

1 Q (BY MS. HORAN) If you'd turn to Page
2 14.

3 A (Witness complies.)

4 Q Starting with your Opinion 2 as to
5 Hadnot Point, you state, "In fact, in his expert
6 report, Maslia points out that the reconstructed
7 concentrations versus the observed data in Table
8 1.7.15 Table 5-5 in this report demonstrates
9 successful level for calibration indicating that
10 the treated water samples were used in the final
11 calibration step for Hadnot Point."

12 Do you see that sentence?

13 A Yes.

14 Q And that sentence -- part of that
15 sentence is a direct quote from Mr. Maslia's
16 report. Fair?

17 A Yes. I assume.

18 MS. BAUGHMAN: That's the rebuttal; not
19 the original report.

20 THE WITNESS: Oh, okay.

21 Q (BY MS. HORAN) We'll --

22 A Yes.

23 Q -- look at his report in a moment.

24 It's your understanding, having now
25 reread this part of your report, that for Hadnot

1 Point, the data points were used for level 4
2 calibration.

3 Is that fair?

4 A It's my understanding.

5 Q Do you mean that the model parameters
6 were adjusted to fit the water distribution
7 system data?

8 MS. BAUGHMAN: Objection. Form;
9 foundation; outside the scope.

10 THE WITNESS: That wasn't part of my --
11 that wasn't part of my assessment, the model
12 itself. How the model was calibrated.

13 Q (BY MS. HORAN) Do you know if any
14 parameters were adjusted in light of the level --
15 or the data from the water distribution system?

16 A It's beyond my scope.

17 Q Are you offering the opinion that the
18 Hadnot Point level 4 calibration was successful?

19 A My opinion --

20 MS. BAUGHMAN: Objection to form;
21 foundation.

22 THE WITNESS: My opinion states that
23 they incorporated these parameters in their
24 process. I have not offered an opinion as to
25 beyond that.

1 Q (BY MS. HORAN) So are you offering --
2 so you're not offering an opinion on whether the
3 level 4 calibration was successful.

4 MS. BAUGHMAN: Objection. Form;
5 foundation.

6 THE WITNESS: Well, my opinion states
7 that...

8 Q (BY MS. HORAN) Well, you've quoted Mr.
9 Maslia as saying a successful level 4
10 calibration, and I'm wondering if you're adopting
11 that opinion or not.

12 A I'm not --

13 MS. BAUGHMAN: Objection to form;
14 foundation.

15 I'm sorry. Where does -- I don't -- I'm
16 looking for the word "successful".

17 MS. HORAN: It's the last row of Page
18 14. It says, "Demonstrates successful level 4
19 calibration" --

20 MS. BAUGHMAN: Gotcha.

21 MS. HORAN: -- "as part of the quote
22 from Mr. Maslia's report."

23 Q (BY MS. HORAN) And I'm trying to
24 understand if you're adopting that.

25 MS. BAUGHMAN: Objection to form.

1 THE WITNESS: What do you mean by
2 "adopting"?

3 Q (BY MS. HORAN) Well --

4 A I'm agreeing with his professional
5 judgment.

6 Q So you agree with Mr. Maslia that it was
7 a successful level 4 calibration.

8 A That's his area of expertise and so I
9 agree with his assessment.

10 Q Did you do anything to independently
11 verify whether the level 4 calibration was
12 successful?

13 A That was beyond the scope of my work.

14 Q Are you offering the opinion that the
15 use of some treated water data points in the
16 level 4 calibration means that the model
17 accurately captured VOC losses at the water
18 treatment plant?

19 MS. BAUGHMAN: Objection to form.

20 THE WITNESS: My opinion speaks for
21 itself. That's the only opinion I have is what
22 is stated.

23 Q (BY MS. HORAN) Yeah.

24 So my question is, whether that opinion
25 means that the use of some water data points from

1 the water treatment plant means that the model
2 accurately captures the VOC losses at the water
3 treatment plant.

4 MS. BAUGHMAN: Objection. Form;
5 foundation.

6 THE WITNESS: My opinion is response to
7 Hennessey's opinion that losses were not accounted
8 for. So my opinion counters Hennessey's opinion
9 that there wasn't consideration of treated water.

10 Q (BY MS. HORAN) So you're not offering
11 any opinion about whether the VOC losses were
12 accurately -- or the use of some data in level 4
13 calibration means that it was done accurately or
14 done well to include -- strike that.

15 I'm going to start over.

16 You're not offering the opinion that the
17 use of some treated water data sample points in
18 the level 4 calibration means that the model
19 accurately captured the VOC losses at the water
20 treatment plant. You're only offering the
21 opinion that you believe they were indirectly
22 considered.

23 MS. BAUGHMAN: Objection to form.

24 THE WITNESS: Yeah, that's my opinion.
25 Certainly, I would say -- well, that's my

1 opinion, as stated here. I think, certainly,
2 there was value added by doing so. That the
3 model -- but my opinion is directed at Hennes's
4 assessment.

5 Q (BY MS. HORAN) What do you mean there
6 was value added by doing so?

7 A Just countering Hennes's suggestion that
8 there was a lack in the model because it did not
9 incorporate such data.

10 Q So -- I'm about to use another document.
11 Would it be okay if we just take a quick break?

12 MS. BAUGHMAN: Of course.

13 THE VIDEOGRAPHER: We're off the record
14 at 3:21 p.m.

15 (Short break from 3:21 p.m. to 3:34 p.m.)

16 THE VIDEOGRAPHER: We're back on the
17 record at 3:34 p.m.

18 Q (BY MS. HORAN) I'm marking as
19 Government Exhibit 12, this is the expert report
20 of Morris Maslia, dated October 25, 2024.
21 (Government Exhibit 12 marked for identification)

22 Q (BY MS. HORAN) And if you could turn to
23 Page 84.

24 A 8-4?

25 Q Yes.

1 A (Witness complies.)

2 Q The second full paragraph reads, "the
3 reconstructed concentrations versus the observed
4 data in Table 7.15 and Figure 7.25 demonstrate
5 successful level 4 calibration as the observed
6 data from the Hadnot Point Water Treatment Plant
7 represents a separate unique data set that has
8 been used, assessed, the goodness of fit of the
9 calibrated Hadnot Point Holcomb Boulevard
10 models."

11 Do you see that?

12 A Yes.

13 Q And that sentence is the sentence that
14 you pulled the quote out in your report.

15 Is that fair?

16 A Looks right. Just to double check.

17 Q And that was on the bottom of Page 14 of
18 your report.

19 A Yes.

20 Q Having read the rest of the sentence, is
21 it still your understanding that the data in
22 Table 7.15 was used in calibration of the Hadnot
23 Point Holcomb Boulevard model?

24 A Well, maybe in terminology of
25 calibration and validation. So I would say yes.

1 Q You can set aside Mr. Maslia's report.

2 A (Witness complies.)

3 Q If two water samples are taken
4 simultaneously, one for raw water and one from
5 the treated water, would the samples
6 concentrations inform on treatment losses?

7 A Say that again.

8 Q Sure.

9 If two water samples are taken
10 simultaneously, one is from the raw water and one
11 is from the treated water, would the sample
12 concentrations inform on treatment losses?

13 MS. BAUGHMAN: Object to the form.

14 THE WITNESS: Conform?

15 Q (BY MS. HORAN) Would they inform on
16 treatment losses. Sorry.

17 MS. BAUGHMAN: Object to the form.

18 THE WITNESS: Under steady state
19 conditions, yes.

20 Q (BY MS. HORAN) Are you familiar with
21 the concept of a tracer sample?

22 A Define what you mean by tracer sample.
23 I'm -- I'm familiar with the concept of tracers.

24 Q What is a tracer that you're familiar
25 with?

1 A Well, there are a number of different
2 tracers. For groundwater, for analyzing the
3 hydraulics of a system in a water treatment
4 plant.

5 Q Are you familiar with the concept of a
6 tracer sample where you would identify -- create
7 a sample in the raw water and then allow it to go
8 through the water treatment plant and then test
9 it again when it's through the treatment process?

10 A Yes.

11 Q Okay. Do you know if any tracer samples
12 were done at Hadnot Point Water Treatment Plant?

13 A Not to my knowledge.

14 Q And you agree that tracer samples would
15 inform on treatment losses at a water treatment
16 plant?

17 A Depends upon how you do the tracer
18 study.

19 Q So if you do the tracer study where you
20 begin the tracer and the raw water and measure it
21 and then the water goes through the water
22 treatment plant, then you remeasure the tracer in
23 the treated water plant reservoir, would you
24 agree that that would inform on treatment losses?

25 A Well, it depends upon the tracer. What

1 kind of tracer are you talking about?

2 Q What kind of tracer would you use in
3 that type of project?

4 A That depends upon what you're trying to
5 achieve.

6 Q You're trying to measure VOC losses.

7 A Then under steady state conditions, yes.

8 Q Why say at steady state simultaneous
9 samples would inform on treatment losses?

10 A Say again. Why?

11 Q Sure.

12 I believe you said earlier that at
13 steady state, simultaneous samples would inform
14 on treatment losses.

15 Fair? Do you recall that testimony?

16 A Well, there are several things working
17 in these questions. I guess I'm curious what
18 you're ultimately trying to get to. Typically
19 when we do a tracer study at a water treatment
20 plant, we're trying to analyze the hydraulics of
21 a basin, and so we would introduce something like
22 chloride, and we would put it in and we'd measure
23 it coming out and that would tell us something
24 about how ideal the reactor is.

25 What you seem to be talking about is

1 putting in a volatile chemical at the inlet and
2 then measuring its concentration.

3 Q So you -- the -- the measurement would
4 be the VOCs. I'm not offering any opinion on
5 what substance you would add to become the
6 tracer.

7 A Okay. Now, what I mean by steady state
8 is you have a constant flow coming in, you have a
9 constant operating process, and you have a
10 constant flow going out. And so you have a
11 steady of concentration of chemical in the inlet
12 and then you have a steady concentration coming
13 out the other side and then you can do a
14 comparison.

15 But if you're introducing something and
16 it's being diluted and it's going through other
17 processes, it's not yet at steady state with the
18 system, then that wouldn't give you the same
19 information.

20 Q So your steady state assumes that the
21 levels of contaminants of VOCs would be coming
22 into the water treatment plant at the same level.

23 A That you're -- you're -- relatively the
24 -- yes. Relatively the same. You're not --
25 you're not introducing something all at once and

1 then watching its appearance the other end.

2 Q And what if you didn't have a steady
3 concentration of VOCs at the inlet to the water
4 treatment plant, for example, because wells were
5 being turned on and off?

6 MS. BAUGHMAN: Object to the form,
7 foundation, incomplete hypothetical.

8 THE WITNESS: Yeah, it's a hypothetical.
9 You'd have to take that into consideration.

10 Q (BY MS. HORAN) So if there was not a
11 steady state, in other words, meaning that the
12 VOCs were not at a constant level coming into the
13 water treatment plant, would two samples that
14 were taken simultaneously, one from the raw water
15 and one for the treated water, inform on
16 treatment losses?

17 MS. BAUGHMAN: Object to the form.
18 Foundation.

19 THE WITNESS: Yes. Yes.

20 Q (BY MS. HORAN) So even without a steady
21 state, the answer's yes?

22 A Well, depends upon how nonsteady state
23 you're saying. Generally, you have -- generally,
24 you have fairly steady state conditions. If you
25 wouldn't want to do such a study when you per --

1 perturbated the system all at once. That
2 wouldn't be the best time to do such an analysis.

3 Q Do you know if the VOCs at Camp Lejeune
4 were in a steady state?

5 MS. BAUGHMAN: Object to the form.

6 Q (BY MS. HORAN) Entering the Hadnot
7 Point or Tarawa --

8 THE REPORTER: Repeat.

9 MS. HORAN: Entering the Hadnot Point or
10 Tarawa Terrace water treatment plants.

11 MS. BAUGHMAN: Object to the form.

12 THE WITNESS: I could imagine there were
13 times when there were fluctuations, but I can
14 imagine times when all the wells were -- when the
15 wells were operating continuously some period of
16 time you would approach steady state.

17 Q (BY MS. HORAN) In your report on Page
18 15, you point to three datasets. One on July 27,
19 1982, and two on December 4, 1984, that show
20 insight into the fate of VOCs at the Hadnot Point
21 Water Treatment Plant.

22 Is that fair?

23 A Yes.

24 Q And you say that while admittedly a
25 small dataset, the data provide further support

1 for the minor to negligible VOC losses, you
2 propose.

3 Fair?

4 A Yes.

5 Q Okay. Turning to the TCE sample from
6 December 4, 1984, do you see that in Table 5-5?

7 A Do I see that as --

8 Q Do you see it in Table 5-5?

9 A Yes.

10 Q Okay. And do you see that for the
11 untreated water, there was 46 micrograms of TCE?

12 A Yes.

13 Q And for the treated water, there was 200
14 micrograms of TCE?

15 A Yes.

16 Q So comparing these two data points from
17 December 4, 1984, the treated water had over 400
18 percent TCE of the untreated water.

19 Is that fair?

20 A In these numbers, yes. Or I mean, it's
21 larger. Haven't done the 400 percent. But yes.

22 Q And you would agree that this is not a
23 tracer sample?

24 A That I couldn't say.

25 Q Have you ever, in your professional

1 experience, seen a time where a water treatment
2 plant increased a VOC concentration by about 400
3 percent?

4 A No.

5 Q And you would agree that if you traced
6 the 46 micrograms of TCE through the water
7 treatment plant, the measurement would be lower
8 as treated water.

9 Fair?

10 MS. BAUGHMAN: Objection; form,
11 foundation.

12 THE WITNESS: I would say it would be --
13 there's no reason to expect it to be higher. It
14 could possibly be lower.

15 Q (BY MS. HORAN) And your calculations,
16 if you turn to Page 14, say it would be roughly
17 7.2 percent lower?

18 MS. BAUGHMAN: Objection to form.

19 THE WITNESS: That would be the -- yes.

20 Q (BY MS. HORAN) How does comparing the
21 treated and untreated sample of TCE from December
22 4th support your opinion that there were losses
23 of 7.2 percent at the Hadnot Point Water
24 Treatment Plant?

25 A The data informed me that there were not

1 losses. Were not occurred.

2 Q You think the Hadnot Point Water
3 Treatment Plant did not have any losses of VOCs?

4 A The data does not suggest -- there's no
5 data to support that there was significant
6 losses.

7 Q Is there data to support that there were
8 not significant losses?

9 A The data I point to here indicate that
10 there -- there's no evidence to support
11 significant losses. So to me, that provides
12 evidence. It provides evidence to support the
13 conclusion.

14 Q So -- sorry, Dr. Sabatini. Are you
15 saying that there was 7. -- your estimate is that
16 there would be 7.2 losses of TCE from the water
17 treatment plants or that there would be no losses
18 from the water treatment plants?

19 MS. BAUGHMAN: Object to the form.

20 THE WITNESS: My calculations estimate
21 7.2 percent and the data -- these data suggest
22 that the losses were negligible.

23 Q (BY MS. HORAN) How does 46 micrograms
24 of TCE in the untreated water and 200 micrograms
25 of TCE in the treated water suggest that the

1 losses were negligible?

2 A There's no indication of losses.

3 Q But you would agree that these are not
4 tracer samples.

5 Fair?

6 MS. BAUGHMAN: Objection; form. Asked
7 and answered three or four times.

8 Q (BY MS. HORAN) Fair? Yes?

9 A I'm sorry?

10 Q We can -- I can withdraw that question.

11 Next to the TCE numbers for December 4,
12 1984, the third column which is reconstructed, do
13 you see the November 1984 shows 639 micrograms of
14 TCE in the simulated model?

15 A November of 1984?

16 Q Yeah. So the December 4, 1984, data
17 samples that we've been talking about of TCE are
18 compared to -- in the chart to the reconstructed
19 model for November 1984 which had 639
20 micrograms --

21 A Yes.

22 Q -- of TCE.

23 Do you see that?

24 A I see that in the table.

25 Q And it's your opinion that simulated

1 reconstructed values account for the water
2 treatment losses.

3 Fair?

4 MS. BAUGHMAN: Object to the form.

5 THE WITNESS: My opinion is that the
6 ATSDR model did indirectly incorporate treated
7 water samples in its analysis. That's my
8 opinion.

9 Q Sorry. It did or did not?

10 A It did.

11 Q It did. Okay.

12 So looking -- do you know how much time
13 it takes TCE to be out of a water treatment plant
14 after contaminated wells stop pumping?

15 MS. BAUGHMAN: Object to the form.
16 Foundation.

17 THE WITNESS: That's a very open-ended
18 question.

19 Do I know?

20 Q (BY MS. HORAN) How much time it takes
21 for TCE to leave a water treatment plant after
22 contaminated wells stop pumping?

23 MS. BAUGHMAN: Object to the form.
24 Object to foundation.

25 THE WITNESS: That's an open-ended

1 question. I mean, not off the top of my head,
2 no.

3 Q (BY MS. HORAN) Would you expect it to
4 be days or weeks or hours?

5 MS. BAUGHMAN: Same objections.
6 Incomplete hypothetical.

7 THE WITNESS: I would have to do -- I'd
8 have to have more information and do some
9 calculations to make a conjecture.

10 Q (BY MS. HORAN) Have you seen any data
11 showing how much time it takes TCE to be out of a
12 water treatment plant after contaminated wells
13 stop pumping?

14 MS. BAUGHMAN: Objection, form.
15 Objection, foundation. Incomplete hypothetical.

16 THE WITNESS: Same -- same response as
17 before.

18 Q (BY MS. HORAN) I just asked if you've
19 seen any data on it.

20 MS. BAUGHMAN: Same objections.

21 THE WITNESS: No.

22 Q (BY MS. HORAN) Agree that when a
23 contaminated well stops pumping, the percentage
24 of water from that well will gradually decrease
25 in the raw, untreated reservoirs?

1 A Say that one more time. Lots of
2 hypotheticals here.

3 Q When a contaminated well stops pumping,
4 the percentage of water from that well will
5 gradually decrease in the raw, untreated
6 reservoirs; correct?

7 A Sure.

8 Q Turning to Tarawa Terrace. On Page 16
9 of your report, the last sentence of the first
10 full paragraph reads, "once again, the fact that
11 Tarawa Terrace level 4 calibration included
12 treated water samples demonstrates the ATSDR
13 indirectly considered losses during water
14 treatment and distribution."

15 Did I read that correctly?

16 A Yes.

17 Q And if you could turn back to
18 Mr. Maslia's report which has been marked as
19 Exhibit 12. And turning to Page 60.

20 A 6-0?

21 Q Yes.

22 You see at Table 7.12 that says,
23 "Computed and observed tetrachloroethylene
24 concentrations in water samples collected at the
25 Tarawa Terrace Water Treatment Plant and

1 calibration target range."

2 A Yes.

3 Q So I believe your report -- and you're
4 welcome to look at it again -- identifies one set
5 of data from July 28th that has raw untreated
6 water.

7 One second.

8 A Yes.

9 Q Okay. Other than the one dataset you've
10 identified in your report from July 28, 1982, can
11 you tell if there was -- or do you know if any of
12 the other data points in 7.12 are of treated
13 water?

14 A I -- it may be -- I think the March 12,
15 1985, has a denotation of upstream and downstream
16 of water treatment plant.

17 Q Sorry. Which date?

18 A What was the question again?

19 Q Yeah. Can you tell which of these
20 samples were -- other than the one you've
21 identified through using CLW 606, were from
22 upstream and downstream? And you're saying --
23 did you say -- I just missed the date.

24 A So those were the two that I used
25 comparison.

1 Q Uh-huh.

2 A And then the text.

3 Q Okay. And you point to the July 28,
4 1982, when the raw water was 76 micrograms and
5 the treated water was 82 micrograms as supporting
6 your opinion that the water treatment process
7 would produce minor VOC losses.

8 A Yes.

9 Q How does an increase in PCE in the
10 treated water show that there would be minor VOC
11 losses at the Tarawa Terrace Water Treatment
12 Plant?

13 A Similar to the discussion before that
14 indicated -- did not indicate losses. There was
15 not evidence of losses.

16 Q So it's your opinion that if upstream
17 water has higher VOCs than downstream water, it's
18 indicative that there are minor losses in a water
19 treatment plant?

20 A Say upstream and downstream.

21 Q Sure. If there's -- if the -- the
22 finish water and the water -- the treated water
23 has higher micrograms of PCE than the untreated
24 water, --

25 A Yes.

1 Q -- it's your opinion that that's
2 indicative that there are minor losses at the
3 water treatment plant?

4 A It does not -- certainly does not
5 suggest that there were losses.

6 Q Do you know what percentage of water in
7 the raw, untreated water samples at Tarawa
8 Terrace on July 28, 1982, came from supply well
9 Tarawa Terrace 26?

10 MS. BAUGHMAN: Objection, form and
11 foundation.

12 THE WITNESS: Not off the top of my
13 head. I'd have to look at records.

14 Q (BY MS. HORAN) What records would you
15 look at to determine that?

16 A I'd have to study back through the
17 reports.

18 Q Do you know if it was the same
19 percentage of Tarawa Terrace 26?

20 MS. BAUGHMAN: Objection, form.

21 THE WITNESS: At this point, I don't
22 know.

23 Q (BY MS. HORAN) Do you still have
24 Mr. Maslia's report in front of you?

25 A Yes.

1 Q Okay. Great.

2 A I'm remembering now as well there was a
3 COW where -- of Camp Lejeune Water Treatment
4 Plant person commented on levels being very
5 similar on either side of the water treatment
6 plant.

7 I'm sorry. That's -- that -- I'm sorry.
8 Go ahead.

9 Q Was that a document that you saw prior
10 to submitting your expert report, or was that
11 after you submitted your expert report?

12 MS. BAUGHMAN: If you remember.

13 THE WITNESS: I don't recall.

14 MS. HORAN: Thank you, Laura, but please
15 keep it to form and foundation.

16 Q (BY MS. HORAN) Do you know the primary
17 source of PCE at Tarawa Terrace? Do you know
18 which well it was?

19 MS. BAUGHMAN: Objection, form and
20 foundation. Outside the scope.

21 THE WITNESS: In my general background
22 reading, I saw the dry cleaner and there were I
23 think three different wells that were
24 contaminated, but I don't remember the numbers.

25 Q (BY MS. HORAN) Looking at Table 7.12 in

1 Maslia's report on Page 60. The day that you
2 compare the two samples, so July 28, 1982, the
3 simulated value that's compared to that is 112
4 micrograms.

5 Is that fair?

6 A That's what the table says.

7 Q If you could turn to page 59.

8 A (Witness complies.)

9 Q Do you -- the first sentence of the last
10 full paragraph reads, "the results shown in
11 Figure 7.13 and Table 7.12 represent the
12 calibrated model being compared to a separate
13 dataset than that used for the calibration of the
14 model, Figure 7.14."

15 Do you see that sentence?

16 A Yes.

17 Q You agree that the observed data in
18 table 7.12 was not used for calibration of the
19 Tarawa Terrace Water Treatment Plant?

20 A 7.13. I'm going back and looking at
21 the --

22 Q Go ahead. Yeah. Take your time.

23 A So appears to me there's a calibration
24 validation aspect to this which are both part of
25 the verification. In my understanding both part

1 of the verification process.

2 Q Your report -- you can turn back to it
3 if needed -- talks about calibration. It doesn't
4 talk about validation.

5 Fair?

6 A I was reusing the terminology that
7 Maslia was using.

8 Fair.

9 Q It's fair.

10 So if you turn to your report on page
11 16, your first paragraph indicates that the data
12 in Table 7.12 was used to calibrate the Tarawa
13 Terrace model.

14 A I was referring to Maslia's terminology.
15 But calibration validation part of the
16 verification process.

17 Q Okay. Where do you say -- strike that.

18 Your report indicates that the -- the
19 data in Table 7.12 was used as the Tarawa Terrace
20 level 4 calibration.

21 Fair?

22 A Relying upon Maslia's report. Yes.

23 Q And now having reviewed Maslia's report
24 again, the -- the data in Table 7.12 was not used
25 in the Tarawa Terrace calibration.

1 Fair?

2 MS. BAUGHMAN: Objection, form and
3 foundation.

4 THE WITNESS: It seems to be mincing --
5 calibration validation to me are part of the
6 model verification process.

7 Q (BY MS. HORAN) You did not write that
8 in your report.

9 Fair?

10 You said that the data in Table 7.12 was
11 used for calibration. You don't talk about
12 validation; correct?

13 A Correct.

14 Q So in your opinion on Page 16 when you
15 said thus, for both, and it's bolded in the
16 middle of the page -- "thus, for both the Tarawa
17 Terrace and Hadnot Point systems, treated water
18 samples were used in the calibration process and
19 ATSDR did consider such losses in the treatment
20 system."

21 Did I read that correctly?

22 A Correct.

23 Q And having now reviewed Maslia's report,
24 data -- treated water samples were not used in
25 the calibration process for Tarawa Terrace.

1 Fair?

2 MS. BAUGHMAN: Objection, form
3 foundation.

4 THE WITNESS: May be a choice of
5 terminology calibration versus validation.

6 Q (BY MS. HORAN) You understand
7 calibration to mean the same thing as validation?

8 MS. BAUGHMAN: Objection, form.

9 THE WITNESS: I see them both as part of
10 the model verification process.

11 Q (BY MS. HORAN) And where does Maslia in
12 his report talk about validation -- of using this
13 data for validation?

14 A That I -- I'd have to go back and review
15 his reports.

16 Q Okay. So can you agree with me that the
17 data -- the treated water samples in Table 7.12
18 were not used to calibrate the Tarawa Terrace
19 model?

20 MS. BAUGHMAN: Objection, form and
21 foundation.

22 THE WITNESS: It's -- from Maslia's
23 report, that seems -- seems to be correct.

24 Q (BY MS. HORAN) And if the Tarawa
25 Terrace -- the ATSDR did not use treated water

1 samples to calibrate the Tarawa Terrace model,
2 then they did not indirectly account for VOC
3 losses during the water treatment storage and
4 distribution.

5 MS. BAUGHMAN: Objection, form.

6 MS. HORAN: Laura, please stop shaking
7 your head.

8 MS. BAUGHMAN: I wasn't shaking my head,
9 for the record.

10 THE WITNESS: My opinion says -- my
11 opinion doesn't speak to calibration.

12 Q (BY MS. HORAN) The last sentence
13 bolded.

14 A 5.2 my opinion --

15 MS. BAUGHMAN: He wasn't finished. Can
16 you let him finish his answer, please.

17 MS. HORAN: Sure.

18 THE WITNESS: 5.2 my opinion --

19 Q (BY MS. HORAN) Uh-huh.

20 A -- says that model indirectly counted
21 for VOC losses and so I -- I feel like my opinion
22 stands because they were considered.

23 Q Sure. And your opinion, too, rests upon
24 all of your analysis for both Hadnot Point and
25 Tarawa Terrace is -- rests on the belief that the

1 data was used in a calibration process; correct?

2 MS. BAUGHMAN: Objection, form.

3 Objection, foundation.

4 THE WITNESS: Calibration, validation to
5 me both point to model being -- accounting for
6 the losses.

7 Q (BY MS. HORAN) And you don't talk about
8 validation in your expert report.

9 MS. BAUGHMAN: Objection, form. Asked
10 and answered about five times already.

11 THE WITNESS: I was re -- I was using
12 Maslia's terminology when he said calibration.

13 Q (BY MS. HORAN) When he said
14 calibration, you understood that to mean
15 calibration or validation?

16 MS. BAUGHMAN: Objection to the form.

17 THE WITNESS: Had he used the term
18 validation, I would have been equally comfortable
19 pointing to validation. Whether used for
20 calibration or validation for me in either, both
21 cases it was accounted for in the model.

22 Q (BY MS. HORAN) And you don't know
23 sitting here today whether ATSDR used the data in
24 Table 7.12 in the Tarawa Terrace model for
25 validation.

1 MS. BAUGHMAN: Objection, form.

2 THE WITNESS: All I can do is refer to
3 Maslia's report and how he used the information.

4 Q (BY MS. HORAN) Okay. I want to turn
5 next to your opinions on water buffaloes. Final
6 opinion.

7 A And I guess as we leave --

8 MS. BAUGHMAN: No, no. She didn't ask
9 you a question. Okay? Unless you feel like you
10 had to correct something.

11 THE WITNESS: Okay.

12 Q (BY MS. HORAN) You agree with
13 Dr. Hennet that there would be additional losses
14 from the water treatment plant as the water
15 buffalo is filled; correct?

16 A Correct.

17 Q So I want to actually turn first to your
18 Appendix A which is response to reports of Remy
19 J.C. Hennet and J. Brigham regarding water
20 buffaloes.

21 Do you have that open?

22 Why did you attach a second expert
23 report to your original expert report instead of
24 just submitting one?

25 MS. BAUGHMAN: Object to the form.

1 To the extent that requires
2 conversations with counsel, I'm instructing you
3 not to answer per the order CMO 17 that we talked
4 about earlier.

5 THE WITNESS: Okay.

6 Q (BY MS. HORAN) Can you answer that
7 question without disclosing your conversations
8 with counsel?

9 A No.

10 Q Are the opinions contained in Appendix A
11 opinions you hold as an expert?

12 A Yes.

13 Q Did you write Appendix A yourself?

14 A Yes. It's my work product.

15 Q And if you turn -- so if I reference
16 Appendix A, you'll understand that I mean your
17 water buffalo --

18 A Yes.

19 Q -- opinions?

20 Okay. Appendix A has its own references
21 list. Sitting here today, is the references list
22 complete, or is there anything you'd like to add?

23 A Nothing to add.

24 Q In forming these opinions, you did not
25 rely on any historical books.

1 Is that fair?

2 MS. BAUGHMAN: Object to the form.

3 THE WITNESS: Historical book.

4 Q (BY MS. HORAN) Books on history.
5 Textbooks on history.

6 A No.

7 Q You didn't rely on any historical
8 studies?

9 A No.

10 Q How did you go about collecting
11 documentation to form your opinions and
12 conclusions in Appendix A?

13 A I reached out to legal staff and asked
14 to help me identify documents pertinent to this,
15 and then synthesized the material from those
16 documents.

17 Q Outside of reaching out to counsel, did
18 you do any independent searches for documents in
19 Google or at a library or any of that?

20 A The materials that I was provided was --
21 were sufficient for me, so I didn't need to do
22 personal, if that's what you're asking.

23 Q So you didn't do any additional research
24 into documents outside of those that were
25 provided to you by counsel.

1 Fair?

2 A Correct.

3 Q And you said that the documents you
4 received were sufficient. How did you make that
5 determination?

6 A They helped us to document the
7 progression in water buffaloes over time.

8 Q Did you speak with anyone -- and I'm not
9 asking about questions -- or conversations with
10 counsel -- but any experts in the field or any
11 members who have been part of the military about
12 your opinions in Appendix A as part of your
13 research in forming them?

14 A No.

15 Q You have received both the depositions
16 of Mr. Hunt and Mr. Cagiano.

17 Fair?

18 A Read those. Yes.

19 Q And having read Mr. Hunt's deposition
20 transcript, did anything jump out at you?

21 A Say again.

22 MS. BAUGHMAN: Objection. Object to the
23 form.

24 Q (BY MS. HORAN) Having read Mr. Hunt's
25 deposition transcript, did anything jump out at

1 you as relevant to your opinions in this case?

2 MS. BAUGHMAN: Object to the form.

3 THE WITNESS: Just -- not separate from
4 what's in the document.

5 Q (BY MS. HORAN) So when you say the
6 document, you mean Appendix A?

7 A Appendix A.

8 Q And when you read Mr. Cagiano's
9 deposition transcript, did that have any impact
10 on the opinions that you're offering in your
11 Appendix A?

12 MS. BAUGHMAN: Object to the form.

13 THE WITNESS: No.

14 Q (BY MS. HORAN) Have you -- I'm sorry.

15 A Not beyond -- again, not beyond -- no.

16 Q Are you aware that Mr. Hunt and
17 Mr. Cagiano have been deposed twice in this case?

18 A I believe --

19 Q You're welcome to look at your reliance
20 list.

21 A I knew -- I knew there was a first
22 interaction with them and then there was a
23 deposition that followed.

24 Q Do you know if they were deposed prior
25 to submitting your expert report?

1 A Well, I know -- let me refer to the
2 document. What's it called in here?

3 Q You're -- you're welcome to look at your
4 reliance list which is Exhibit 3 or the reference
5 list. I'll represent to you I haven't seen that
6 you've seen or reviewed their original deposition
7 transcript from prior to submitting your report.

8 A I know they had affidavits.

9 Q Uh-huh.

10 A Yes. I know more that they -- they had
11 affidavits before my report.

12 Q And are you aware that they had also
13 been deposed before your report?

14 A I don't recall.

15 Q And if you had those deposition
16 transcripts, those would be on either your
17 reliance list or your references list?

18 A Yes. They...

19 Q Turning to Page 2. The last sentence of
20 the first full paragraph says, "based on my
21 review of historical documentation as discussed
22 below, I disagree in part with Drs. Hennet and
23 Brigham regarding how water buffaloes were filled
24 at Camp Lejeune over time.

25 Do you see that?

1 A Yes.

2 Q What parts do you agree with Dr. Hennet
3 and Brigham?

4 MS. BAUGHMAN: Objection to the form.

5 THE WITNESS: That they were filled.
6 They were filled from stand pipes that -- and I
7 have to refer back to -- I don't have Brigham's
8 -- I remember Brigham had a number of things in
9 his report that I agreed with.

10 Q (BY MS. HORAN) So you agree that they
11 were filled via stand pipes?

12 A Well, that was -- yes. Stand pipes or
13 at times suggestions was maybe fire hydrants.

14 Q Do you have any opinion on where the
15 stand pipes or fire hydrants that the water
16 buffaloes were filled were located on base?

17 A Just based on what's in the depositions
18 and in the location to the industrial area where
19 they said they were often filled.

20 Q Do you understand that there are parts
21 of the base such as Camp Johnson wherein the
22 plaintiffs have not alleged contamination of the
23 water treatment system?

24 A Say that again.

25 Q Do you understand that there are parts

1 of the base wherein the plaintiffs have not
2 alleged that there was contamination, and one of
3 those would be Camp Johnson.

4 Just as --

5 A I'm not aware of that.

6 Q Okay. Is your opinion in Appendix A
7 based on any -- strike that.

8 What knowledge, skill, experience,
9 training, or education do you have such that your
10 review of historical documentation on water
11 buffalo filling would assist the judge in
12 understanding how water buffaloes were filled
13 between 1953 and 1987?

14 MS. BAUGHMAN: Object to the form.

15 THE WITNESS: In general, as a
16 researcher we know how to review documents and
17 synthesize information to get a background to
18 work from when we're proposing our research. So
19 those skills translate into trying to develop an
20 outline of the background of what water -- water
21 buffaloes how they transitioned over time based
22 upon publicly available documents.

23 Q (BY MS. HORAN) Anything else?

24 A No. I guess that would be the main
25 thing we talked before about my interest in

1 Lincoln, in history.

2 Q You said as a researcher. Do you mean
3 as a -- in your capacity as an engineer? Strike
4 -- strike that.

5 You're a civil engineer; correct?

6 A Correct.

7 Q Okay. When you said researcher, did you
8 mean researcher in your capacity as a civil
9 engineer, or what did you mean?

10 A Specifically to the research, that would
11 be the case. I guess to my Lincoln hobby, I've
12 taken several courses in history and had to do
13 historical research relative to Lincoln
14 documents. Of course, they weren't using water
15 buffaloes in Lincoln's time. But...

16 Q Prior to this litigation, what was your
17 experience with water buffaloes?

18 A Virtually none.

19 Q You say virtually none. Is that -- I
20 think you talked it earlier you might have seen a
21 few on a base?

22 A I might have seen a few on being -- I'm
23 sorry. Pause, pause, pause.

24 I might have seen them when working on
25 military bases for remediation projects.

1 Q But you never saw a water buffalo when
2 used or being filled?

3 A Not being filled, no.

4 Q Prior to this litigation, had you ever
5 read a manual on water buffaloes?

6 A No.

7 Q Prior to this litigation had you ever
8 read a manual on how to fill a water buffalo?

9 A No.

10 Q Are you aware that the plaintiffs have a
11 historian expert?

12 A Yes.

13 Q Have you met Dr. Longley or spoken with
14 him on the phone or Zoom or email?

15 A No.

16 Q Have you read his reports?

17 A Yes.

18 Q Do you recall if you read his report
19 before or after you submitted your rebuttal
20 report?

21 A Before.

22 Q Earlier, you mentioned -- and consistent
23 with your report -- that water buffaloes on base
24 can be filled via a stand pipe with a fill hose
25 or a fire hydrant.

1 Are there any other sources where a
2 water buffalo would be filled on base that you're
3 aware of?

4 A Not that I'm aware of.

5 Q A water buffalo filled via fire hydrant
6 would have a lower fill time; correct?

7 A That would be the expectation.
8 Certainly. Yes.

9 Q And there would be a lower fill time
10 because of a higher flow rate there?

11 A Correct.

12 Q And a higher flow rate would cause more
13 turbulence when filling the water buffalo.

14 Fair?

15 A Expect more splashing. I would use the
16 word splashing. Because, again, turbulence --
17 laminar flow, turbulent flow, but yes.

18 Q Splashing is the preferred term?

19 A Not a highly technical term, but yes.

20 Q Fair enough.

21 And the splashing when filling a water
22 buffalo or -- strike that.

23 The increased splashing when filling a
24 water buffalo with a higher flow rate would lead
25 to more VOC losses.

1 Is that fair?

2 A You'd have more surface area -- you'd
3 have somewhat more surface area for mass
4 transfer, so you'd expect that. You would have
5 less time for volatilization in the downstream
6 flow, but splashing would potentially add some
7 more surface area.

8 Q I want to turn first to the M 106 model.
9 And again, your report's in front of you. Please
10 reference it as needed.

11 A What page?

12 Q If you could turn to Page 5.

13 A 5?

14 Q Uh-huh.

15 A (Witness complies.)

16 Q You agree that the M 106 -- strike that.
17 Throughout this next section, I might
18 refer to a water buffalo just by its technical
19 name like M 106 or M 107. You'll understand when
20 I use one of those that I'm talking about that
21 version of the water buffalo.

22 Fair?

23 A Fair.

24 Q Okay. You agree that the m 106 has a
25 filler hatch and strainer; correct?

1 A Correct.

2 Q And you agree that the M 106 water
3 buffalo could be filled through the hatch and
4 strainer?

5 A Correct. Well, the 106 has a -- looks
6 like a hand pump that can fill through the filler
7 hatch. Figure 2.

8 Q Uh-huh.

9 A Yes.

10 Q Yep.

11 Is there -- okay. Yeah.

12 So you agree that the water buffalo
13 could be filled through the hatch and strainer;
14 correct?

15 A Correct.

16 Q And you said that there was a bell hose
17 -- a bell strainer for the M106?

18 A Inserted into the filler.

19 Q Sure.

20 Is there any reason to think that the
21 top of the filler hatch could not open so that it
22 could be filled from the top?

23 MS. BAUGHMAN: Objection, form.

24 THE WITNESS: Say again.

25 Q (BY MS. HORAN) Sure.

1 The -- the filler hatch for the M 106.

2 A Yes.

3 Q Do you agree that you could open the
4 filler hatch and fill the water buffalo through
5 that hatch?

6 A As opposed to through the pump?

7 Q Yes.

8 A Certainly possible. I mean, it seems to
9 be possible.

10 Q Turning to Page 7, you see Figure 5 is
11 the M106 filling instructions from October of
12 1951?

13 A On Page 7. The --

14 Q Yeah. So what you're pointing to, but
15 if you look at the bottom, it says Figure 5.

16 A Okay.

17 Q And it's the M 106 filling
18 instructions --

19 A Okay.

20 Q -- for 1951.

21 Okay. And the section that you have
22 highlighted in your report says operation of
23 regular equipment of water tank trailer M 106.

24 Do you see that?

25 A Say again.

1 Q The top --

2 A Top. Yeah.

3 Q -- of Figure 5 says operation of regular
4 equipment of water tank trailer M 106; correct?

5 A Yes.

6 Q And right below that 32, it says 32,
7 loading and unloading water tank.

8 Do you see that?

9 A Yes.

10 Q And you would agree that these are
11 essentially instructions on how to fill a M 106
12 water buffalo?

13 A Yes.

14 Q Okay. And B says loading tank from
15 overhead free-flowing source.

16 Do you see that?

17 A Yes.

18 Q And C says loading tank from source from
19 which water must be pumped.

20 A Yes.

21 Q Agree that for C, the M 106 water pump
22 is attached to the filler hatch?

23 A Say again.

24 Q Yeah.

25 For instructions C.

1 A C.

2 Q Yes.

3 A Yeah. Okay.

4 Q You agree that that's instructions for
5 the water pump which is attached to the filler
6 hatch?

7 A Yes.

8 Q Okay. On Page 7 right below that image,
9 the second sentence, you say the fill point moved
10 from the manhole cover to the filler hatch with
11 the introduction of this model when using an
12 overhead free-flowing source.

13 Do you see that?

14 A Yes.

15 Q Okay. Could you turn to Page 15 of your
16 report?

17 A 16?

18 Q 15.

19 A 15.

20 Q Okay. The first sentence of the first
21 full paragraph says, the phrase of interest in
22 the filling instructions which was used in
23 several earlier water buffalo technical manuals
24 is free-flowing source. A free-flowing source
25 implies gravity fed which suggests the fill hatch

1 was never intended to be filled with a high
2 pressure, high flow hose that was tapped into the
3 base's water distribution system.

4 Did I read that correctly?

5 A Yes.

6 Q Okay. So a free-flowing source implies
7 gravity fed. That's your understanding?

8 A That would be one understanding of that.
9 Yes.

10 Q So if you turn back to Page 7.

11 A Yes.

12 Q And input that analysis into Figure 5,
13 phrase B would read loading tank from overhead
14 gravity fed source.

15 Fair?

16 A I'm sorry. Say that again.

17 Q Sure.

18 So I believe on Page 15, you come to the
19 conclusion that free-flowing source means that it
20 was gravity fed.

21 Is that fair?

22 A That's -- that's one interpretation of
23 that term. Yes.

24 Q So if you turn back to the instructions
25 you've identified in Figure 5.

1 A Uh-huh.

2 Q And you see Section B says loading tank
3 from --

4 A Okay.

5 Q -- overhead free-flowing source.

6 A Yes.

7 Q So if you input your analysis into that,
8 it would read loading tank from overhead gravity
9 fed source.

10 A That would be one interpretation. Yes.

11 Q So what type of source is an overhead
12 gravity fed source?

13 A Well, if you had a water tank, an
14 elevated water tank, that would provide pressure
15 to have overhead flow.

16 Q So if you were essentially dumping one
17 tank into the fill hatch?

18 A If you were near the water treatment
19 plant or near one of the water towers associated
20 with water treatment plant, then that elevated
21 water tank would provide free-flowing water
22 without requiring a separate pump.

23 Q Anything else you can think of that
24 would qualify as an overhead gravity fed source?

25 A That would be the one that would come to

1 mind. An elevated storage tank.

2 Q Have you ever seen any indication
3 through your research that water buffaloes were
4 filled through an overhead storage tank?

5 A Well, that's part of any distribution
6 system. And we talked before about the water
7 treatment plants and the different elevated water
8 tanks. So those provide pressure to the water
9 distribution system. And so that would be
10 gravity fed. You pump water up into the elevated
11 storage tank like every city has and then the
12 water from the elevated storage tank flows by
13 gravity through the distribution system.

14 Q So where would the hose that goes to the
15 filler hatch be located?

16 A So you would have a water distribution
17 line buried in the ground and the elevated
18 storage tank would be pressurizing the water in
19 that water distribution line. Then you would
20 have the stand pipe tapping into that buried
21 water distribution line coming up.

22 Q Got it.

23 So an overhead free-flowing source could
24 be the fill pipe --

25 A Yep.

1 Q -- could be the stand pipe.

2 A Yep.

3 Q Okay. So for Figure 5, Section B, that
4 could be how you fill it via a stand pipe.

5 A Correct.

6 Q Okay. You would agree that the M 106
7 water loading instructions do not direct a marine
8 to fill the water buffalo through a manhole.

9 A Correct. Do not. Correct.

10 Q Yeah.

11 Okay. On Page 7, the last paragraph,
12 the next iteration after the M 106 was the M 107,
13 and you agree that that had a filler hatch and
14 strainer; correct?

15 A Correct.

16 Q And you agree that --

17 A And a manhole cover.

18 Q And a manhole cover. Fair enough.

19 You agree that the M107 could be filled
20 via the filler hatch and strainer; correct?

21 A Could be. Yes.

22 Q If you turn to Page 14 of your report.

23 A (Witness complies.)

24 Q You see Figure 17 says August 1972 M107
25 fill process?

1 A Yes.

2 Q And that above that, the text that
3 you've written says in the August 1972 edition,
4 which supersedes the October 1964 edition shown
5 above, the fill process switches from being done
6 through the filler hatch to the manhole cover as
7 described in the text below.

8 Do you see that sentence?

9 A Yes.

10 Q So it wasn't until 1972 that there was
11 any reference to filling the water buffalo
12 through the manhole cover, the M 107; correct?

13 A Not -- not in terms of the manholes.
14 No.

15 Q If you turn to Page 15.

16 A 1-5?

17 Q Yes.

18 The last sentence says, in the 1972
19 edition, the text specifically calls out that
20 when filling through the manhole cover, a
21 pressure pump can be used which is equivalent to
22 water flow pressure like that's supplied by the
23 water distribution system.

24 Fair?

25 A Yes.

1 Q And you agree that prior to 1972, the
2 water buffalo could have been filled through the
3 filler hatch using the stand pipe.

4 A Could have been, yes.

5 For convenience, I imagine they might
6 have preferred filling it through the manhole,
7 but certainly the filler hatch was what was in
8 the manual.

9 Q You said for convenience, you might
10 imagine that they would fill them through the
11 manhole.

12 What is that based off of?

13 A Ease of opening the manhole, the -- if
14 you look at that strainer, the -- would be easier
15 to put the pipe over a big manhole than over that
16 small filler hatch. The ability of the filler
17 hatch to accommodate the high flows. A number of
18 things. I could imagine.

19 Q But you agree that the filler hatch
20 could accommodate the pressure from the stand
21 pipe?

22 MS. BAUGHMAN: Objection, form.

23 THE WITNESS: I agree that you could
24 certainly use the stand pipe to fill through the
25 filler hatch. I question whether that strainer

1 would allow that volume of water to come through
2 un-- unhindered.

3 Q (BY MS. HORAN) Um.

4 A That there might be backsplashing.

5 Q Do you have any documents that suggest
6 that prior to 1972, marines, as a matter of
7 course -- strike that.

8 Turning to Page 21 of your report. And
9 I think this is what you were getting at. You
10 state at the top of it, for those M 107s earlier
11 than 1972, it is my position that these units
12 more likely than not would -- would have also
13 been filled through the manhole cover.

14 Correct?

15 A That's correct. That's stated.

16 Q And that's what you were just alluding
17 to; correct?

18 A Correct.

19 Q Okay. And your basis for that is
20 Mr. Hunt's affidavit. The filler hatch being
21 able -- well, strike that.

22 Number 2 says the filler hatch, as
23 outlined in several of the manuals, is designated
24 for free-flowing water supplies and earlier
25 versions fed by a hand pump; correct?

1 A Correct.

2 Q And so we've established that the filler
3 hatch, when it said overhead free-flowing source,
4 meant it could be a stand pipe; correct?

5 A Could be. Correct.

6 Q Okay. And then the third point you list
7 is that from 1968 to 1972, there were water
8 buffaloes that could only be filled through the
9 manhole cover.

10 Fair?

11 A Correct.

12 Q Other than these three data points, is
13 there anything else that you've relied upon in
14 determining that marines would only have ever
15 filled water buffaloes through the manhole cover?

16 MS. BAUGHMAN: Objection to the form.

17 THE WITNESS: It impressed me why would
18 you fill highly treated drinking water through a
19 strainer. So that's what got me puzzled about
20 that and wanted to pursue this further to see
21 what the documentation said and see what some of
22 the experience was.

23 It impressed me that as in the early
24 versions there was a hand pump. That that was
25 more likely used for filling from a lake or some

1 source that had debris.

2 Q (BY MS. HORAN) And you agree that the
3 earlier versions or the versions pre 1972 do not
4 mention filling the water buffalo through the
5 manhole cover.

6 A That's correct.

7 Q But they do reference filling the
8 manhole through the filler hatch.

9 Fair?

10 MS. BAUGHMAN: Objection, form.

11 THE WITNESS: Say that again.

12 Q (BY MS. HORAN) The manuals pre 1972
13 reference filling the water buffalo through the
14 filler hatch.

15 Fair?

16 A Correct.

17 Q Okay. In Number 1 of this, you state,
18 on a regular basis, he, meaning Mr. Hunt,
19 observed the filling of M107 water buffaloes and
20 all of those he observed were filled through the
21 manhole cover.

22 Do you see that?

23 A Yes.

24 Q Have you read Mr. Hunt's deposition?

25 A Yes.

1 Q Are you aware that he said he saw it
2 filled less than ten times?

3 A I'd have to look back at my notes.
4 (Government Exhibit 13 marked for identification)

5 Q (BY MS. HORAN) I'm marking as Exhibit
6 13 this is the deposition of Ernest David Hunt
7 from March 11, 2025.

8 Could you turn to Page 33?

9 A Whoops. Guess I got two of them.
10 Sorry.

11 Q No, it's okay. Could you actually keep
12 this one? Because it's the one with the sticker.

13 A 30 -- 33 again?

14 Q Yes.

15 So there's four pages on one. So I
16 guess it's --

17 A Yeah. I've got it.

18 Q Okay. So beginning on line 23, it says:

19 "QUESTION: Do you recall roughly
20 how many times you witnessed a
21 water buffalo being filled at
22 Camp Lejeune?"

23 If you turn to the next page,

24 "ANSWER: Just a few times. I
25 don't really -- I don't recall

1 the number.

2 "QUESTION: Would you say less
3 than 10? Less than 20? Less
4 than 100? Do you have any --

5 "ANSWER: Less than -- less than
6 10."

7 A Uh-huh.

8 Q Does the fact that Mr. Hunt observed a
9 water buffalo being filled less than ten times
10 impact your opinion in any way that water
11 buffaloes prior to 1972 were likely filled only
12 through the manhole?

13 A No.

14 Q Could you turn to page 29 of the --

15 A Whoops.

16 Q Yeah. Sorry.

17 A I jumped the gun.

18 Q Page 29.

19 A 29?

20 Q Uh-huh.

21 A (Witness complies.)

22 Q So beginning on line 18, it reads:

23 "QUESTION: Okay. So this
24 record has you starting at
25 Camp Lejeune on March 17 of

1 '65. And if you turn the
2 page around, you will see
3 that it has you leaving on
4 October 7th of '66.

5 "ANSWER: Correct.

6 "QUESTION: Does this sound
7 about right to you?

8 "ANSWER: Yes."

9 And then -- Okay.

10 And you were aware that Mr. Hunt saw
11 water buffaloes being filled less than ten times
12 between March of 1965 and October of 1966.

13 Fair?

14 A Yes.

15 Q Does that change your conclusion in any
16 way, that water buffaloes prior to 1972 were
17 likely filled only through the manhole?

18 A No.

19 Q Could you turn to Page 8 of your report?

20 A 8?

21 Q Uh-huh.

22 A (Witness complies.)

23 Q The middle of the page reads filling the
24 M107 A1 is still directed to be done through the
25 filler hatch as described in Figure 7 below.

1 Do you see that?

2 A Yes.

3 Q You agree that nothing in the loading
4 the water tank instructions for the M 107 A1
5 directs filling the water buffalo through a
6 manhole cover; correct?

7 MS. BAUGHMAN: Objection, form.

8 THE WITNESS: In these guidelines,
9 correct.

10 Q (BY MS. HORAN) You've identified Figure
11 7 as the M 107 A1 filling instructions.

12 A Correct.

13 Q And you agree that nothing in Figure 7
14 directs you to fill the tank through the manhole
15 cover; correct?

16 A Correct.

17 Q Turning to Page 9, you agree that the
18 M 149 had a filler hatch and strainer; correct?

19 A Yes.

20 Q And you agree that the M 149 could be
21 filled through the hatch and strainer?

22 A Could be. Yes.

23 Q If you turn to Page 12 of your report.

24 A (Witness complies.)

25 Q Are you there?

1 A Yes.

2 Q Okay. The text in the middle of the
3 report says, the significance of this note is
4 that as early as December of 1968, the Army is
5 acknowledging that the M 149 A1 was not equipped
6 with a strainer and the use of a strainer became
7 optional for the M 149 in cases where the
8 strainer was damaged or found defective.

9 Did I read that correctly?

10 A Yes.

11 Q Have you found any documentation that
12 prior to December of 1968 the use of strainers in
13 water buffaloes was optional if they were damaged
14 or defective?

15 A Say that again.

16 Q Have you found any documentation that
17 prior to December of 1968, the use of strainers
18 in water buffaloes was optional if they were
19 found damaged or defective?

20 A No. Not to my knowledge. No.

21 Q So at least from 1953 to December of
22 1968, the manuals instructing how to load water
23 into a water buffalo instructed filling through
24 the filler hatch.

25 Fair?

1 A Fair.

2 Q And from 1953 to December of 1968, the
3 manuals instructing how to load water into a
4 water buffalo did not mention filling a water
5 buffalo through the manhole; correct?

6 A Correct.

7 Q On Page 9, the first -- and you can
8 correct me if I'm wrong -- manual that I was able
9 to identify from your report for the M1 --

10 A I'm sorry. Where? On Page 9?

11 Q Yeah. Page 9.

12 A Okay.

13 Q Just generally.

14 A Okay. I thought you were pointing to
15 something.

16 Q Do you know when the first M149 A1
17 became available?

18 A I would have to look back through. Off
19 the top of my head, no, but I'd have to look back
20 through.

21 Q So in -- on Page 9, you have Figure 10
22 which shows both the M149 and the M149 A1, and
23 that's attributed to June of 1971.

24 Do you agree?

25 A I'm not tracking. Trying to track what

1 you said here on the page here.

2 Q Sorry.

3 A You said on Page 9.

4 Q Yeah. So on Page 9, it says the
5 illustration below, Figure 10.

6 A Okay.

7 Q Is from a manual from June of 1971.

8 A Uh-huh.

9 Q Fair?

10 A Fair.

11 Q Okay.

12 A With and without the filler hatch.

13 Q On Page 12, the text in the middle, the
14 first sentence of the second paragraph says, "In
15 1970, the M149 A1 underwent a tank design
16 change."

17 How did you determine that happened in
18 1970?

19 A I'd have to look back at my -- have to
20 look back at my sources. I don't recall right
21 now.

22 Q Okay. Turning to Pages 19 and 20. You
23 identified via inventory that Camp Lejeune had
24 M149 and M107 water buffaloes; correct?

25 A Say again. M --

1 Q M107 A2, M107, and then M149 water
2 buffaloes.

3 Fair?

4 A M129.

5 Q 129?

6 A Is that what you said?

7 Q No. Sorry.

8 Okay. Figure 22 of your report
9 identifies as part of the 1968 equipment that
10 there were M107 and M107 A2 water buffaloes.

11 A Yes.

12 Q Fair?

13 A Okay. Yes. I misunder -- misheard you.

14 Q And then if you turn to Figure 23,
15 you've identified that the 1999 inventory had
16 M149 water buffaloes.

17 A Yes.

18 Q You state in -- you state in Page 20 --
19 the second to last sentence of the first
20 paragraph says, "This supports that the base was
21 transitioning from M107 to the M149 A1s during
22 the 1970s."

23 Did I read that correctly?

24 A Yes.

25 Q Did you find any documentation

1 supporting that the M149 A1 was in inventory at
2 Camp Lejeune beyond Mr. Cagiano's affidavit?

3 A Beyond...

4 Q Sure.

5 So was there anything other than Mr.
6 Cagiano's deposition -- excuse me, affidavit, any
7 other documents you found supporting that Camp
8 Lejeune transitioned from M107s to M149 A1s
9 during the 1970s?

10 MS. BAUGHMAN: Object to the form.

11 THE WITNESS: Shows up on this
12 inventory. What's the date on this inventory?
13 '99. Not that I recall.

14 Q (BY MS. HORAN) In 19 -- the Figure 23,
15 you say 19 -- from 1999. Do you see that?

16 A That's the indication.

17 Q You agree that that says M149, but does
18 not indicate M149 A1.

19 Fair?

20 A That's correct.

21 Q For determining the fill time, you
22 determined that it likely took between two or
23 three minutes to fill a water buffalo.

24 Fair?

25 A Fair.

1 Q And is that -- or that's through the
2 manhole; correct?

3 A Correct.

4 Q Did you determine the fill time through
5 the strainer?

6 A No.

7 (Government Exhibit 14 marked for identification)

8 Q (BY MS. HORAN) I'm marking as Exhibit
9 14 -- this is Camp Lejeune Justice Act Litigation
10 Rebuttal Report of Kyle Longley.

11 And Dr. Sabatini, could you please turn
12 to Page 23.

13 A 27?

14 Q 23.

15 A 23. I was going to say 27 is this.

16 (Witness complies.)

17 Q Three lines up from the bottom of that
18 paragraph, the sentence reads, "The marines could
19 fill the water buffaloes at Hadnot Point in 10 to
20 20 minutes."

21 Do you see that?

22 A Yes.

23 Q Do you know what source Mr. Longley was
24 using for that position, or that statement?

25 A Well, he -- no. He has a reference

1 there, but that seems to be for the next
2 sentence.

3 Q And that reference is to the Ensminger
4 oral history?

5 A Yeah. Seems to be for the following
6 sentence.

7 Q But you disagree with Dr. Longley that
8 it wouldn't take 10 to 20 minutes to fill a water
9 buffalo at Hadnot Point?

10 A Through the manhole. Now, through the
11 strainer -- yeah, I would envision it would take
12 longer through the strainer because it would
13 accept -- I imagine my professional judgment is
14 it could not handle as fast a flow.

15 Q So does this indicate to you that some
16 marines filled the water buffaloes through the
17 fill hatch?

18 MS. BAUGHMAN: Object to the form.

19 THE WITNESS: I couldn't speculate.

20 Q (BY MS. HORAN) You can put that aside,
21 Dr. Sabatini.

22 MS. HORAN: We've been going for about
23 an hour and a half. Would you mind taking just a
24 10-minute break?

25 THE WITNESS: Sure. Sure.

1 THE VIDEOGRAPHER: We are off the record
2 at 5:02 p.m.

3 (Short break from 5:02 p.m. to 5:12 p.m.)

4 THE VIDEOGRAPHER: We're back on the
5 record at 5:12 p.m.

6 Q (BY MS. HORAN) Turning to your report,
7 not the Appendix A, on Page 19, you show
8 calculations for water buffaloes in Table 5.6.

9 Is that fair?

10 A Fair.

11 Q And you use the same study as Dr. Hennes
12 to do your calculations in Table 5.6; correct?

13 A Correct.

14 Q And that's the McKone and Knezovich 1991
15 study?

16 A Correct.

17 Q One of the edits you make to the McKone
18 and Knezovich study is that the fall height in
19 your opinion should be .4 meters instead of 1.6
20 meters used in the study.

21 Is that fair?

22 A Restate that.

23 Q Sure.

24 One of the edits you make to the McKone
25 and Knezovich study is that the fall height in

1 your opinion should be .4 meters instead of 1.6
2 meters that they used in the study.

3 A In applying it to the water buffaloes.
4 Correct. Not that McKone should have used .4
5 meters.

6 Q Ah.

7 A Adjusting his results to this situation.

8 Q Sure.

9 And your proposed 75 percent reduction
10 due to differences in fall height relies on the
11 assumption that the fall height is directly
12 proportional to volatile loss; correct?

13 A Correct.

14 Q And what's your basis for that
15 assumption?

16 A Time of volatilization.

17 Q So the fall height would be directly
18 related to the time. Fair?

19 A Correct.

20 Q Turning back to your Appendix A on Page
21 21. Do you see Figure 24 is showing that the
22 water buffalo is being filled from just outside
23 the manhole cover?

24 A Meaning that the pipe -- yes.

25 Q And if you look at Figure 25, the water

1 buffalo is being filled about half a person size
2 over the manhole.

3 Fair?

4 A Correct.

5 Q Okay. Are Figure 24 and Figure 25, in
6 your opinion, representative of filling
7 operations of water buffaloes at Camp Lejeune?

8 MS. BAUGHMAN: Object to the form.

9 THE WITNESS: Represented from other
10 sites but could well be examples of what it might
11 look like. I might also add Figure 27 to the
12 discussion.

13 Q (BY MS. HORAN) Sure.

14 And Figure 27 shows a water buffalo
15 being filled via fire hydrant with the fire
16 hydrant hose just on the lip of the manhole
17 cover.

18 Is that fair?

19 A It's hard to tell. The pipe may not be
20 inserted. Either way.

21 Q Would -- if you turn to Figure 25, the
22 fact that the stand pipe fill hose is at least
23 two feet above the manhole cover, impact your
24 calculations for fall height as done in your
25 expert report?

1 A Potentially.

2 Q And how potentially would they impact
3 your calculations?

4 A Would be additional time for
5 volatilization in the travel distance. I might
6 add as another data point, Hennes's deposition,
7 he mentioned that the filling of the water
8 buffalo, he observed the water -- the fill pipe
9 was near the entrance to the manhole.

10 Q And you saw the photos from Dr. Hennes's
11 February visit where he observed the water
12 buffalo being filled?

13 A I saw photos. I'm not sure -- I don't
14 recall exactly all the -- the specifics. But
15 yes, I saw photos.

16 Q And you read the testimony or listened
17 to the testimony of Dr. Hennes about his viewing
18 of water buffaloes in the February 2025 visit.

19 Fair?

20 A In the February visit. Yes.

21 Q And having seen those photos and read
22 that testimony, does it have any impact on any of
23 your opinions in your report?

24 MS. BAUGHMAN: Object to the form.

25 THE WITNESS: No.

1 Q (BY MS. HORAN) Turning back to your
2 report on Page 19. Row 3 says assuming downward
3 velocities are the same.

4 Do you see that?

5 A Yes.

6 Q What did you mean by that?

7 A I assume that the -- I assume that the
8 shower experiments translated to the water
9 buffalo filling except the only -- the only
10 adjustment that was necessary was the, I'll say
11 fall height distance. I don't want to confuse
12 fall height with fall height from the spiractor.

13 Q A lot of fall heights today.

14 Does a vertical strainer spread the
15 water more efficiently compared to a showerhead?

16 A Oh, that's -- it could go either way.

17 Q And why could it go either way?

18 A I mean, it's -- that's speculation.
19 Showerhead has tiny nozzles that direct the water
20 intentionally out. Where as a strainer is just
21 there to remove debris. The openings in the
22 strainer grid coarser than the fine orifices in
23 the showerhead.

24 Q Have you seen a strainer from a water
25 buffalo in person?

1 A No.

2 Q Have you seen a water buffalo in person?

3 MS. BAUGHMAN: Objection. Asked and
4 answered.

5 THE WITNESS: Yeah, no.

6 MS. HORAN: Okay.

7 A I've answered that before, but no.

8 Q (BY MS. HORAN) Could you turn to Page 6
9 of your Appendix?

10 A (Witness complies.)

11 Q Do you see Figure 4? And you've
12 highlighted Number 22.

13 A Yes.

14 Q Which is the strainer element.

15 A Yes.

16 Q And you would say that that strainer
17 element has holes, more or less than a
18 showerhead?

19 A I'm sorry. Would --

20 Q Does the strainer in Figure 2 -
21 identified as 22 in Figure 4 have more or less
22 holes --

23 A Holes.

24 Q -- than a showerhead.

25 A I would say more.

1 Q Would you agree that the strainer would
2 have a larger spray pattern than a showerhead?

3 MS. BAUGHMAN: Object to the form.

4 THE WITNESS: No.

5 Q (BY MS. HORAN) Why not?

6 A No.

7 Q Yeah. Why -- why not?

8 A Why not? The -- well, it even says here
9 this is to remove sediment. So I -- just my
10 professional judgment would be that it would not.

11 Q So if you attach a fill hose to the
12 strainer on 22, wouldn't water come out of the
13 strainer holes throughout the entire strainer, as
14 long as it's not submerged?

15 A Yes.

16 Q And so the strainer holes at the top,
17 the water will come out and go all the way to the
18 bottom or wherever the filling process is in the
19 water buffalo.

20 Fair?

21 A Fair.

22 Q And so it would be more efficient at
23 volatilization of TCE than assumed in your
24 calculations, so long as the strainer was not
25 submerged.

1 Fair?

2 MS. BAUGHMAN: Objection to the form.
3 Foundation.

4 THE WITNESS: It's an interesting
5 argument. I just followed Hennessey's approach. I
6 didn't adjust -- I didn't adjust the spray
7 diameter from what Hennessey used.

8 Q (BY MS. HORAN) But you --

9 A For filling through the strainer.

10 MS. HORAN: Could you repeat my
11 question?

12 THE REPORTER: "And so it would be more
13 efficient at volatilization of TCE than assumed
14 in your calculations, so long as the strainer was
15 not submerged."

16 MS. BAUGHMAN: Objection to form.

17 THE WITNESS: I didn't do calculations.
18 The only adjustment I made was for the time not
19 for spray or -- I assumed the same spray pattern
20 that Hennessey did in the filler hatch calculation.

21 Q (BY MS. HORAN) So sitting here today,
22 you don't have any opinion on whether the
23 strainer in a water buffalo would be more
24 efficient at volatilization of TCE than assumed
25 in your report?

1 MS. BAUGHMAN: Object to the form.

2 THE WITNESS: I would say that I
3 followed the same approach that Hennet followed.

4 Q (BY MS. HORAN) Did you do any analysis
5 to determine whether the -- strike that.

6 Assuming that the water strainer would
7 have a larger spray pattern than a showerhead, it
8 would have a higher -- greater volatilization
9 because of a greater surface air between --
10 greater surface area between the air and the
11 water.

12 MS. BAUGHMAN: Object to the form.

13 THE WITNESS: That's speculative. I
14 wouldn't care to comment on not seeing data or
15 evidence. And again, I'll just refer back to, I
16 followed the same approach that Hennet did
17 relative to the strainer. Just adjusting for
18 time.

19 Q (BY MS. HORAN) In your report, you then
20 switch to talking about filling through the
21 manhole cover, which begins on Page 20 of your
22 report. Prior to issuing your opinion, you had
23 watched a YouTube video where water buffaloes
24 were filled correct?

25 A Say that again.

1 Q Prior to issuing your rebuttal report,
2 you had watched a YouTube video where water
3 buffaloes were being filled; correct?

4 A Yes.

5 Q And the video showed splashing and
6 aeration while the water buffalo was being
7 filled.

8 Fair?

9 A Yes.

10 Q And volatilization losses happen
11 relatively more in the presence of splashing and
12 aeration.

13 Fair?

14 MS. BAUGHMAN: Object to the form.

15 THE WITNESS: Depends upon the degree of
16 splashing. It's surface area again. So if the
17 splashing creates some additional surface area,
18 there's additional possibility for
19 volatilization.

20 Q (BY MS. HORAN) An increase in surface
21 area between the air and water will increase
22 volatilization; correct?

23 A Correct.

24 Q After you determine --

25 A Maybe just add one point to that. The

1 shower hitting the floor would cause splashing.
2 And so there's a degree of the splashing that
3 you're describing that was inherent in the shower
4 experiment that I was working from.

5 Q And did you take that into consideration
6 in your analysis in any way other than following
7 McKone?

8 A That, to me, helped account for
9 splashing that might have occurred filling
10 through the manhole.

11 Q Was there any analysis that you did to
12 compare the splashing in a manhole with the
13 splashing accounted for in the shower experiment?

14 A No.

15 Q Do you know if there's more or less
16 splashing in filling a water buffalo through the
17 manhole than in a shower?

18 A I would have to assess that. But I
19 would -- you have certain amount of water hitting
20 the floor and agitating. So I couldn't comment
21 on the relative amount, but I would consider them
22 in the same category.

23 Q But you haven't done an assessment of
24 that yet?

25 A No. No.

1 Q When you determined that a water buffalo
2 was filled through the manhole, did you do any
3 analysis to determine if the shower is still the
4 most apt analogy?

5 A Whether the shower was --

6 Q Still the most appropriate analogy.

7 A I did look for other approaches. But I
8 found that -- in my searching, I found that
9 Hennet's approach was -- I could adjust that
10 approach.

11 Q What other approaches did you look into?

12 A I looked for -- from a faucet. And then
13 the kitchen is one example that I looked at.

14 Q Can you remember any other things you
15 looked at, sitting here today?

16 A Well, I mean, I searched. I searched --
17 so anything that I could have found that would
18 have been similar to a faucet, a bath tub or
19 something of that nature.

20 Q Would you agree that filling a water
21 buffalo through the manhole cover is more similar
22 to a bath tub?

23 MS. BAUGHMAN: Object to the form.

24 THE WITNESS: I think the -- I mean what
25 I had to work on, I was responding to Hennet's

1 report. And so I adapted his approach for the
2 situation at hand.

3 Q (BY MS. HORAN) Sure.

4 And you determined -- you introduced
5 some new facts. And I'm wondering if when you
6 introduced those new facts, that changed any
7 analysis in where you determined that a --
8 filling a water buffalo is more similar --
9 through the manhole -- is more similar to filling
10 a bath tub than a shower.

11 MS. BAUGHMAN: Object to the form.

12 THE WITNESS: That would be speculation.

13 Q (BY MS. HORAN) Well, no. I'm asking if
14 you considered it.

15 A Well, yeah, I mean I'd just have to
16 speculate. There's -- you could see similarities
17 and differences. But in the absence of being
18 able to find such an approach, I went with the --
19 I -- I adapted to Hennet's approach.

20 Q Do you know whether the EPA has ever
21 studied VOC losses through filling a bath tub?

22 MS. BAUGHMAN: Object to the form.
23 Foundation.

24 THE WITNESS: Not to my knowledge. I
25 wasn't -- I did a search and wasn't able to find

1 such information.

2 Q (BY MS. HORAN) What in your model
3 accounts for the splashing of the water and the
4 general movement of the water --

5 A Agitation.

6 Q Agitation.

7 -- when you fill through the manhole?

8 A I'll refer back to the shower -- two
9 things. The shower water hitting the floor and
10 -- that agitation. I also included a -- in my
11 Table 20 -- on Page 22.

12 Q Uh-huh.

13 A I introduced a line 4 which Hennet did
14 not include in his analysis. Losses doing daily
15 use of the water buffaloes. And so that was an
16 attempt to account for additional losses. In an
17 attempt to be conservative.

18 Q Anything else? Any other way you
19 accounted for splashing and agitation?

20 A Just those two factors.

21 Q I believe you said earlier that you
22 thought that the fact that a strainer on a water
23 buffalo intended to remove sediment would be
24 consistent with the strainer holes being smaller
25 than a shower.

1 A Say again.

2 Q I -- earlier, you testified that it was
3 your understanding that the strainer in a water
4 buffalo would be used to remove sediment.

5 Do you recall that?

6 A I was -- actually referring to that in
7 that one caption. It says sediment removal.

8 Q And what impact would that have on the
9 size of the holes compared to a shower? Would
10 they be larger or smaller?

11 A Size of a hose compared to a shower.
12 I'm not sure I understand the relationship.

13 Q Sure.

14 So if you have a strainer that's
15 designed to filter out sediment, would you expect
16 the holes in the strainer to be larger or smaller
17 than those in a showerhead?

18 A It would depend upon what size of
19 sediment was being removed. I could see it going
20 either way. I'd have to -- I'd have to see a --
21 a strainer.

22 Q Do you know what sediment would have
23 been removed from the water buffaloes strainer?

24 A I could imagine that it was -- no, I
25 don't. But I could imagine, if you're filling

1 from a lake or a pond, you're trying to remove
2 sediment from that water source would be my
3 impression.

4 Q And if you're removing sediment from a
5 lake or a pond, would the strainer holes be
6 larger or smaller than those in a showerhead?

7 A I could see that going either way. I
8 could see a case where it might be smaller and I
9 could see a case where it might be larger. The
10 smaller it is, the harder it would be for the
11 water to get through the strainer. So as the
12 holes get -- the holes, or I would say grid, in
13 the strainer get smaller and smaller, create more
14 and more resistance of water flow and would be
15 harder to fill through that strainer.

16 Q And the smaller the holes, the larger
17 the surface area of the water going through it?

18 A Could be.

19 Q You state that the higher velocity
20 during filling via the manhole leads to 33
21 percent less volatilization due to less time
22 falling from the pipe.

23 Fair?

24 A You're referring to my calculations?

25 Q Yes.

1 A That -- that adds to the fall height and
2 the -- yes. Can you restate the question?

3 Q Sure.

4 You state that a higher velocity during
5 filling via the manhole will lead to a 33 percent
6 less volatilization due to less time falling from
7 the pipe.

8 A We're talking through the manhole now?

9 Q Uh-huh.

10 A And you're referring to my calculations?

11 Q Correct.

12 A I think the 33 -- it's a combination of
13 the spray diameter and the time the fall -- the
14 time for volatilization.

15 Q A higher velocity would also create more
16 aeration upon impact.

17 Fair?

18 A And that comes back to the analogy of
19 the shower experiment where the water hitting the
20 floor of the shower would cause splashing.

21 Q If a water buffalo was used for more
22 than one day in the field, would the loss of TCE
23 be higher than you estimated for half a day or
24 one day?

25 MS. BAUGHMAN: Object to the form.

1 THE WITNESS: That's speculative. So
2 again, if it was used for...

3 Q (BY MS. HORAN) More than one day.

4 A That could increase volatilization.

5 Q Did you account for temperature changes
6 of the water and air in the water buffaloes?

7 A I assume that could go both ways. Lower
8 temperatures would have one effect; higher
9 temperatures would have another effect.

10 Q So did you account for it in your model?

11 A I assumed that that evened out because
12 it could go both ways.

13 Q Earlier, you recall we were talking
14 about calibration and validation of the model
15 with your Opinion 2. Is it your understanding
16 that calibration and validation are synonymous?

17 MS. BAUGHMAN: Object to the form.

18 THE WITNESS: I'd have to defer to the
19 -- I'd have to defer to the experts in that area.
20 The people that were doing that part of the work.
21 That was not my focus.

22 Q (BY MS. HORAN) You've read Dr.
23 Konikow's expert report and his deposition?

24 A Yes.

25 Q Do you agree with Dr. Konikow that a

1 model cannot be validated?

2 MS. BAUGHMAN: Object to the form.
3 Foundation.

4 THE WITNESS: I'd have to review the
5 context of his report and -- to see what you're
6 referring to.

7 Q (BY MS. HORAN) Isn't it the case that
8 calibration validation of a model are distinct
9 processes?

10 MS. BAUGHMAN: Object to the form. Lack
11 of foundation.

12 THE WITNESS: Again, I'd have to defer
13 to those that focused on that aspect of the
14 project.

15 Q (BY MS. HORAN) Have you ever calibrated
16 or validated a model?

17 A Define model. Yes, I have. But -- in
18 my experimental work, we develop models and we
19 validate them.

20 Q If you defer to the experts such as Mr.
21 Maslia, then you would agree that Tarawa Terrace
22 wasn't calibrated with treated water samples.

23 Fair?

24 MS. BAUGHMAN: Object to the form.
25 Foundation.

1 THE WITNESS: I'm sorry. I keep asking
2 you to repeat questions. Please, one more time.

3 Q (BY MS. HORAN) Sure.

4 If you defer to the experts, as you've
5 stated, then you would agree that Tarawa Terrace
6 wasn't calibrated with treated water samples.

7 A No, I would not agree with that
8 statement.

9 Q Do you recall looking at Mr. Maslia's
10 report earlier today? We looked at Mr. Maslia's
11 report earlier today in regards to Tarawa
12 Terrace. It stated that the model was not
13 calibrated using the treated water samples;
14 correct?

15 A I'm not in a position to comment on
16 calibration validation. I defer to those that
17 were focused on that aspect of the project.

18 Q Sure.

19 And if you were incorrect and the Tarawa
20 Terrace model by ATSDR was not calibrated using
21 treated water samples, then the ATSDR model for
22 Tarawa Terrace would not indirectly account for
23 VOC losses at the water treatment plant.

24 MS. BAUGHMAN: Object to the form.
25 Foundation and asked and answered.

1 THE WITNESS: Yes. I agree.

2 Q (BY MS. HORAN) Earlier in this
3 deposition, you stated that you had seen the
4 photos from Dr. Hennes's visit and read
5 deposition testimony about his February 2025
6 visit.

7 Do you recall that?

8 A I read his deposition. That included
9 discussion about that visit.

10 Q And part of that was Dr. Hennes's
11 measurement of the Hadnot Point spiractor.

12 Fair?

13 A Correct.

14 Q And you understood Dr. Hennes's
15 measurements of the spiractor that he conducted
16 in February 2025?

17 MS. BAUGHMAN: Objection to form and
18 foundation.

19 THE WITNESS: Yeah, it's -- there wasn't
20 documentation to his pictures. So I can't say
21 that I fully understand -- that I understood what
22 exactly was done.

23 Q (BY MS. HORAN) So through his photos
24 and testimony, you were not able to fully
25 understand how Dr. Hennes measured the spiractor

1 at Hadnot Point?

2 A No. I will comment that it was an
3 empty, non-operating -- no chance to see the
4 constricted water reducing the fall height. So
5 to me, the AH photos that incorporate those are
6 -- are valuable.

7 Q And sitting here today, do you have any
8 methodology that you could use to measure a
9 spiractor fall height while the spiractor is in
10 use?

11 MS. BAUGHMAN: Object to the form.

12 THE WITNESS: I have no question that it
13 could be done.

14 Q (BY MS. HORAN) Do you know how to do
15 it?

16 A I can't say -- I can't say how exactly I
17 would do it, but given time and resources, it
18 could be done.

19 Q During the breaks today, have you spoken
20 with counsel about any substance related to your
21 testimony?

22 A Just a reminder to let you finish a
23 question, to pause. So we had discussions in
24 that nature.

25 Q Anything else related to the substance

1 of your testimony?

2 A Nothing substantive. Just the
3 procedural-type issues.

4 Q Okay. Dr. Sabatini, thank you very much
5 for your time today.

6 A Thank you.

7 MS. HORAN: I will pass the witness.

8 MS. BAUGHMAN: And how much time's left?

9 THE VIDEOGRAPHER: We are at six hours
10 and 58 minutes.

11 EXAMINATION

12 BY MS. BAUGHMAN:

13 Q Dr. Sabatini, I have some questions for
14 you. Okay. First, let's -- let's talk about
15 Exhibit 3. If you can pull that up. Pull that
16 from your materials.

17 A Say again.

18 Q Exhibit 3. That's the supplemental and
19 amended materials considered list.

20 A One. Got them mixed up. This one.

21 Q Okay. All right. Did you prepare the
22 supplemental/amended materials considered list
23 dated April 9, 2025?

24 A Legal staff prepared this for me.

25 Q Okay. I want to -- turn, please, to

1 Page 9 where it says, additional materials
2 considered.

3 A (Witness complies.)

4 Q Okay. Now, turn -- well, first of all,
5 I just want you to look at the volume, or the
6 number of documents, from Page 9 to Page 30.
7 Just flip through.

8 A Okay.

9 Q Did you review this volume or this
10 number of new documents between the time that you
11 signed your report on January 14, 2025 and to
12 April 9, 2025?

13 A No.

14 Q Okay. In that timeframe, from after you
15 signed your report January 4 -- 14, 2025 until
16 today, can you identify new documents that you
17 reviewed that you had not reviewed prior to
18 finalizing and signing your report?

19 A I think there was just the CLW
20 mentioned. Other than -- other than maybe a CLW,
21 no.

22 Q Okay. Well, you -- to be fair, there
23 are depositions that didn't exist before.

24 A I'm sorry. I'm sorry.

25 Q And you reviewed those depositions;

1 right?

2 A Yes. Yes. I'm sorry. Yes. Yes.

3 Q So other than the depositions that
4 didn't exist before January 14, 2025 and a CLW
5 document that you've referenced, can you think of
6 any other document you reviewed after signing
7 your report that's new?

8 A No. Not to my recollection. No.

9 Q Okay. Do you know why there's this --
10 and especially, the number of Bates-stamped
11 documents -- do you know why there's so many
12 documents from Page 9 to Page 30 of Exhibit 3?

13 MS. HORAN: Objection. Foundation.

14 THE WITNESS: Background information
15 that did not play into my rebuttal report. Much
16 -- much of it.

17 Q (BY MS. BAUGHMAN) Okay. So to the best
18 of your knowledge, other than the one CLW
19 document and the depositions that have been taken
20 after January 14, 2025, are there any new
21 documents that you're relying on for your
22 rebuttal report that you reviewed after signing
23 your report?

24 A No.

25 Q Okay. Just to refresh your

1 recollection. December 9, 2024. That's the date
2 of Dr. Hennet's report. And the date of your
3 report is January 14, 2025. In that timeframe,
4 is there a reason why you did not request to go
5 to Camp Lejeune for a site visit?

6 A I felt we -- with the AH report and
7 Hennet's report, I had the data, the information
8 I needed to make my assessment, my calculations.
9 And I actually -- the AH values from 2004 were
10 meaningful to me. Felt they were more relevant
11 than anything I might see in 2025.

12 Q Why is that?

13 A Just more representative of what was
14 there in -- decades ago. They also operating --
15 show the spiractor in operation which is
16 important in terms of the fall height.

17 Q Being AH did that?

18 A Yes.

19 Q Okay. All right. We'll get to that in
20 a few minutes.

21 Can you pull out -- can you pull out
22 Exhibit 7 for me?

23 A 7?

24 Q Yes.

25 A Okay.

1 Q So if you remember, defense counsel
2 asked you a question about a vent --

3 A Yes.

4 Q -- on the -- the water buffalo --

5 A Correct.

6 Q -- using that document.

7 Does this vent that's on the water
8 buffalo change your calculations and opinions
9 regarding volatilization from the water
10 buffaloes?

11 A No.

12 Q Why not?

13 A This is similar to the -- if you will,
14 this is similar to the vents on the reservoirs at
15 the water treatment plant. Allows water to
16 escape as water is filled up -- air to escape as
17 water is filled up to the valves. Air to --
18 prevents pressurization in the vessel.

19 Q What affect would it have to
20 volatilization?

21 A It would -- it's not -- there's not --
22 causing air to flow over the water in a way that
23 would increase volatilization.

24 Q Okay. You made a statement earlier
25 today in response to defense counsel's questions.

1 You said something like, given an ultimate amount
2 of time, VOCs leave water.

3 Do you recall saying that?

4 A Yes.

5 MS. HORAN: Objection to form.

6 Q (BY MS. BAUGHMAN) What do you mean by
7 "ultimate amount of time"?

8 A An extreme amount of time much, much
9 greater than what's practical in a water
10 treatment plant reservoir.

11 Q So both you and Dr. Hennet used --
12 what's the name of the -- the calculation that
13 you used? Here.

14 A For the -- the fall height or --

15 Q No, no. Here. The volatilization from
16 water. It's in Thomas.

17 A Thomas.

18 Q Okay. If VOCs leave water just from
19 having -- from being exposed to air, why is the
20 Thomas method necessary?

21 A Henry's law calculates -- tells us where
22 it would happen at equilibrium, but we're often
23 far from equilibrium in practice. And so the
24 whole reason that AH and Hennet used the Thomas
25 method is to recognize that in practical

1 applications, we're often far from equilibrium
2 and so we have to use a kinetic-based model to
3 account for volatilization.

4 Q Okay. So if you look at Exhibit 9, if
5 you could turn to Table 15-3.

6 MS. HORAN: What page is that?

7 THE WITNESS: Say again.

8 Q (BY MS. BAUGHMAN) Table 15-3.

9 A Okay.

10 Q It's the same table defense counsel
11 asked you about in her questions.

12 A Okay.

13 MS. HORAN: Think it's on Page 15-20.

14 THE WITNESS: Page 15-20.

15 Q (BY MS. BAUGHMAN) And do you recall
16 that you were asked a number of questions about
17 the fact that Dr. Hennet used .008 --

18 A Yes.

19 Q -- for the oxygen reaeration
20 coefficient? Correct?

21 A Correct.

22 Q Look at -- under river. What's the
23 first literature value reported for an oxygen
24 aeration coefficient for river?

25 A 0.008.

1 Q The same one that -- used by Dr. Hennet?

2 A Yeah.

3 Q Okay. I want to ask you a few questions
4 about recarbonation basins. There's a
5 recarbonation basin at Hadnot Point; is that
6 correct?

7 A Yes.

8 Q Actually, let's look at the schematic
9 that you have in your report. Make sure we're
10 talking about the same thing. Okay.

11 MS. HORAN: What page?

12 Q (BY MS. BAUGHMAN) If you could turn to
13 Page 3, Figure 3-1.

14 A (Witness complies.) Yes.

15 Q Okay. So Figure 3-1, Hadnot Point water
16 treatment plant in your report, you took that
17 from AH Environmental report; is that right?

18 A Correct.

19 Q Okay. And it shows the recarbonation
20 basin after the spiractors; correct?

21 A Correct.

22 MS. HORAN: Objection to the form.

23 Q (BY MS. BAUGHMAN) Okay. Was the
24 recarbonation basin operating in 2025?

25 MS. HORAN: Objection to form.

1 Foundation.

2 THE WITNESS: No.

3 Q (BY MS. BAUGHMAN) How do you know that?

4 A Not to my knowledge. No.

5 Q How do you know that?

6 A That's the indication -- I'm sorry. In
7 20- --

8 Q '25.

9 A Yeah. To my knowledge, no.

10 Q Okay. What about in 2004, when AH
11 Environmental was out investigating and seeing --
12 making site visits to the Hadnot Point water
13 treatment plant? Was the recarbonation basin
14 operating?

15 A According to the report --

16 MS. HORAN: Objection to the form;
17 foundation.

18 THE WITNESS: According to the report,
19 no.

20 Q (BY MS. BAUGHMAN) Okay. Since we got
21 the objection, let's turn to the AH Environmental
22 report. It's attached to your report. And if
23 you could turn to Page 2-8.

24 A 2-8. (Witness complies.)

25 Q Read the first sentence on 2-8, please.

1 A "At some unknown time in the past
2 decades, the plant operators discontinued
3 recarbonation."

4 Q Okay. And that's stated in the --

5 A 2004.

6 Q -- in the 2004 report of AH?

7 A Yes.

8 Q Okay. And have you -- in all of your
9 work that you've done in this case, have you seen
10 any indication in any document, including Dr.
11 Hennessey's report, that indicates that the
12 recarbonation basin was used at any time from the
13 decades prior to 2004 until 2025?

14 A No.

15 Q Okay. So while we're talking about the
16 recarbonation basin -- we're on Page 4-2 -- I
17 want to -- well, turn to Page 4-2 of AH 2004
18 report that's attached to your report.

19 A (Witness complies.)

20 Q And this is what I want to ask you.
21 Even though the recarbonation basin wasn't
22 running, what role did it play in terms of your
23 calculations regarding volatilization at the
24 Hadnot Point water treatment plant?

25 A The AH indicates that the recarbonation

1 basin created a constriction that caused water to
2 back up in the effluent pipe of the spiractor and
3 reduced the fall height. And so even though it
4 was no longer operating as a recarbonation basin,
5 water was still flowing through it to get from
6 the spiractors to the filters.

7 Q This statement on Page 4-2 of AH. Can
8 you read the sentence that starts "because of the
9 downstream recarbonation basin"? Can you read
10 that?

11 A Because of the downstream recarbonation
12 basin at the plant, the available head loss --

13 Q The available --

14 A -- the available head does not appear to
15 allow fall height of greater than approximately 1
16 foot.

17 Q And?

18 A And the effluent pipe is likely to be
19 flowing full.

20 Q Okay. What does that mean, the
21 available head? What's the available head that
22 does not appear to allow fall height of greater
23 than 1 foot? What's that available head mean?

24 A That's just the energy of being able to
25 -- the fall height that the water can go.

1 Q Okay. And so what is it about the
2 Hadnot Point water treatment plant that's not
3 allowing the fall height to be greater than 1
4 foot?

5 A The recarbonation basin creating a
6 blockage, if you will, to the water flowing.

7 Q And if -- if the water treatment plant
8 is not running and the spiractor is empty, would
9 one be able to see the fact that the fall height
10 can't be greater than 1 foot?

11 MS. HORAN: Objection to form.

12 THE WITNESS: No. You couldn't -- you
13 can only determine that under hydraulic flowing
14 conditions.

15 Q (BY MS. BAUGHMAN) Okay.

16 A Then as we said before, Figure 4-3 shows
17 a nice demonstration of what it looks like
18 without the back. Holcomb Boulevard that didn't
19 have the restriction has a much cleaner, deeper
20 fall height.

21 Q Okay. So just for the record, did
22 Holcomb Boulevard have a recarbonation basin?

23 A No.

24 Q Okay. And so you're saying Figure 4-3
25 shows what -- what -- the fall would look like --

1 or what the flow would look like at the spiractor
2 without a recarbonation basin.

3 A With a 2-foot fall height.

4 Q Okay.

5 A And AH points that out in their
6 document.

7 Q Okay.

8 A They say, on Page 4-2, if I might,
9 "However, Holcomb Boulevard water treatment
10 plant, because of the absence of recarbonation,
11 water falls approximately 2 feet to the bottom of
12 the pipe section."

13 MS. BAUGHMAN: Can I -- do you have any
14 stickers over there?

15 THE REPORTER: (Hands exhibit stickers
16 to Ms. Baughman.)

17 MS. BAUGHMAN: Thank you.

18 What's our next one? Next exhibit?

19 MS. O'LEARY: We're at 14.

20 MS. BAUGHMAN: 14 is next?

21 MS. O'LEARY: No. 15.

22 MS. BAUGHMAN: 15. Thank you.

23 MS. HORAN: Do you want to just do
24 Plaintiffs' Exhibit 1?

25 MS. BAUGHMAN: It does say Plaintiffs'

1 Exhibit. You want me to start with 1, then?

2 MS. HORAN: Yeah, I think that would
3 probably be cleaner.

4 MS. BAUGHMAN: Okay. All right.
5 (Plaintiffs' Exhibit 1 marked for identification)

6 MS. HORAN: Do you have a copy of it for
7 me?

8 MS. BAUGHMAN: Yes. But I'm just not
9 quite ready yet.

10 MS. HORAN: Oh, Sorry.

11 MS. BAUGHMAN: Give me a second.

12 Q (BY MS. BAUGHMAN) If you could turn to
13 Page 16 of your report which is Exhibit 2.

14 A (Witness complies.)

15 Q Okay. I'm going to turn your attention
16 to the second full paragraph where you refer to
17 Maslia's table -- and this is in the context --
18 this is discussing your Opinion Number 2;
19 correct?

20 A Say again. This is...

21 Q Okay. So just for context, we're
22 talking about Opinion Number 2 here.

23 A 2. Correct.

24 Q Okay. And in this Page 16, the second
25 full paragraph, you reference a document CLW606

1 regarding the July 28, 1982 samples.

2 Do you see that?

3 MS. HORAN: Objection to form.

4 THE WITNESS: Yes.

5 Q (BY MS. BAUGHMAN) Okay. So I'm going
6 to hand you what I've marked Plaintiffs' Exhibit
7 1. And is Plaintiffs' Exhibit 1 CLW606 that you
8 referenced in your report at Page 16?

9 A Yes.

10 Q It is? Okay.

11 So in your report, you're referring to
12 samples of the Hadnot Point water treatment plant
13 taken on July 28, 1982; correct?

14 MS. HORAN: Objection to form.

15 I think you meant Tarawa Terrace.

16 MS. BAUGHMAN: Thank you. Let me -- let
17 me -- let me try that again.

18 Q (BY MS. BAUGHMAN) On your report on
19 Page 16, when you're referring to CLW606, you're
20 referring to July 28, 1982 samples taken at
21 Tarawa Terrace.

22 A Yes. Tarawa Terrace. Yes.

23 Q And they're both raw water and treat
24 water; correct?

25 A Yes. Correct.

1 Q And what were the findings?

2 A The raw water was 76 and the treated
3 water was 82.

4 Q Okay. Samples taken on the same day?

5 A Yes. That's --

6 Q Okay. And you cited Exhibit 1, CLW606,
7 in support of that proposition; correct?

8 A Correct.

9 MS. HORAN: Objection to form.

10 Q (BY MS. BAUGHMAN) Okay. I want to turn
11 your attention to -- well, first of all, the
12 first page of 606. This tells -- who wrote this
13 document? Who's the author?

14 MS. HORAN: Objection to form;
15 foundation.

16 MS. BAUGHMAN: What's the objection to
17 asking who the author is so I can -- so I can
18 rephrase the question, what's the objection?

19 MS. HORAN: So I mean, we can all read
20 what this document says, but I don't know if what
21 he's --

22 MS. BAUGHMAN: So what's wrong with the
23 form?

24 MS. HORAN: -- his understanding of this
25 is.

1 MS. BAUGHMAN: Okay. Okay.

2 Q (BY MS. BAUGHMAN) Dr. Sabatini, who is
3 the author of Exhibit 1, CLW606?

4 MS. HORAN: Same objection.

5 THE WITNESS: Ms. Betz.

6 THE REPORTER: I'm sorry. What was the
7 answer?

8 THE WITNESS: B-e-t-z.

9 Q (BY MS. BAUGHMAN) Okay. And what was
10 Ms. Betz's job title, according to the document?

11 A Quality control lab.

12 Q Okay. So if you turn to the second page
13 on Paragraph Number 8, does Ms. Betz provide any
14 opinion regarding the significance of the raw and
15 treated samples that you cite in your report in
16 terms of what she thought about what that told
17 her?

18 MS. HORAN: Objection to form;
19 foundation.

20 THE WITNESS: Point 8, she comments on
21 the tetrachloroethylene from Tarawa -- well, yes,
22 she does.

23 Q (BY MS. BAUGHMAN) And what does she
24 say?

25 A Level of tetrachloroethylene from Tarawa

1 Terrace system averaged --

2 Q Let me withdraw that.

3 A Okay.

4 Q Let me ask you this.

5 Do you see where she starts with
6 "therefore"?

7 A Therefore. Therefore. Yes. Okay.

8 Q Okay. What does Ms. Betz tell us in
9 terms of what she thought the difference was
10 between the raw and treated samples at Tarawa
11 Terrace?

12 A "Therefore, with no significant
13 difference between raw and treated samples."

14 Q Okay. So what -- so Ms. Betz -- you see
15 at the bottom, she signed this document?

16 A Supervisor chemist.

17 Q With a signature; correct?

18 A Correct.

19 Q So do you agree with Ms. Betz that there
20 was no significant difference between the raw and
21 treated samples at Tarawa Terrace on July 28th of
22 1982?

23 MS. HORAN: Objection to form.

24 THE WITNESS: Correct.

25 Q (BY MS. BAUGHMAN) What was your answer?

1 A Yes. Correct.

2 Q Okay. And let me ask you this. You
3 also looked at some comparisons between raw and
4 treated samples for Hadnot Point; correct?

5 A Yes. On -- yes.

6 Q Okay. And you discuss that on Page 15
7 of your report.

8 A Correct.

9 Q Okay. And defense counsel asked you
10 some questions about the December 4, 1984
11 samples. But can you tell me what the results
12 were for July 27, 1982, in terms of the
13 difference between the raw and treated samples at
14 Hadnot Point?

15 A July 27th. Nineteen and 21.

16 Q '82.

17 A Yeah. 19 micrograms per liter and 21
18 micrograms per liter.

19 Q Okay. Now, you've referenced that and
20 several other pairs of samples taken for raw and
21 treated on the same day for Hadnot Point;
22 correct?

23 A Correct.

24 Q Okay. So what significance if any to
25 your opinions is there comparing these raw

1 untreated samples at Hadnot Point and Tarawa
2 Terrace with regard to your Opinion Number 1?

3 A They were reinforced -- they validate --
4 they support the lack of volatilization minimal
5 to -- minimal to negligible volatilization. They
6 help support my calculations that the losses
7 would be minor.

8 Q Okay.

9 A They help support my opinion which was
10 minor losses.

11 Q Now, I want to go back to the AH 2004
12 report for a moment. Do you know what AH based
13 its opinions and conclusions on in that report?

14 MS. HORAN: Object to the form.

15 THE WITNESS: Well, they state it
16 upfront. So Page 1-1. Bottom paragraph.
17 They're retained by Camp Lejeune. Scope of work
18 included developing estimates. As part of this
19 effort, AH conducted a literature review, a
20 search of appropriate archives to assist in the
21 development referenced estimates of VOC losses,
22 removal rates.

23 And also in their 2005 expert panel,
24 they discuss further the -- all that they did.
25 Evaluating all the basins, looking for any

1 disruptions in the basins, et cetera.

2 Q (BY MS. BAUGHMAN) Okay. Give me just a
3 moment.

4 Okay. If you could turn to Page 2-5.
5 Section 2.3 under water plant descriptions.

6 A Uh-huh.

7 Q What did AH base its description of the
8 water plant on?

9 A Based on interviews with base personnel,
10 site visits, examinations of design, and as-built
11 drawings pertain to part of this project.

12 Q Okay. Do you know whether AH, in coming
13 up with its opinions and conclusions regarding
14 the extent of volatilization at the water
15 treatment plants at Camp Lejeune, whether they
16 took into account any kind of agitation or
17 splashing in the tanks or the air -- or the water
18 towers or the water reservoirs?

19 A In their expert report, they comment
20 that they looked for any evidence of agitation
21 and they narrowed it down to the things that they
22 based their calculations on.

23 Q So when you say expert report --

24 A I'm sorry. Panel. Expert panel.

25 Q Okay. And when you expert panel, are

1 you referring to the comments by Dr. Pommerenk?

2 A Yes.

3 Q From what year?

4 A 2005.

5 Q Okay. And so what did Dr. Pommerenk say
6 in 2005 rather about whether they took agitation
7 into account in reaching their conclusions on
8 volatilization?

9 A Said that they took all those factors
10 into consideration in identifying where they
11 needed to focus their calculations and their
12 estimations.

13 Q Okay.

14 MS. BAUGHMAN: Okay. I'll pass the
15 witness.

16 FURTHER EXAMINATION

17 BY MS. HORAN:

18 Q Do you know what percentage of water in
19 any of the paired treated and untreated samples
20 that you cited in your report -- do you know if
21 -- what wells any of those samples came from?

22 A What any of those...

23 Q Samples came -- what wells were on when
24 those pairs were taken. Do you know what wells
25 were on?

1 A Not off the top of my head. No.

2 Q Do you know whether the wells or pump
3 rates of the wells consistent at the time of any
4 of the paired treated and untreated samples?

5 MS. BAUGHMAN: Object to the form.

6 THE WITNESS: I'd have to look in the
7 documentation.

8 Q (BY MS. HORAN) So sitting here today,
9 you don't know the answer?

10 A No.

11 Q At one point in your questioning with
12 your counsel about the amended materials
13 considered list, you said in reference to new
14 documents that were added that you've reviewed
15 since filing your rebuttal report.

16 The CLW you mentioned. What document
17 were you referencing when you said that?

18 A I don't remember the number. It was one
19 that -- right now, I don't recall.

20 MS. BAUGHMAN: I handed you what I
21 thought it was earlier today. You can ask him if
22 that's it.

23 THE WITNESS: Yeah, that's --

24 MS. BAUGHMAN: And to tell you the
25 truth, that document that I handed you, the

1 important part, is 606 which he already had.

2 THE WITNESS: Okay. That's it then.

3 Q (BY MS. HORAN) It's the 606 document
4 that you were thinking of?

5 A Yes.

6 Q It doesn't look like that was included.

7 MS. HORAN: This is not intended to be a
8 memory test. Could you just identify?

9 MS. BAUGHMAN: Can I see that one?

10 MS. HORAN: (Hands document to Ms.
11 Baughman.)

12 MS. BAUGHMAN: Yeah. Thank you.

13 Can we go off the record for a second.

14 THE VIDEOGRAPHER: We're off the record
15 at 6:13 p.m.

16 (Off the record from 6:13 p.m. to 6:14 p.m.)

17 THE VIDEOGRAPHER: We're back on the
18 record at 6:14 p.m.

19 Q (BY MS. HORAN) Would you agree that if
20 pump rate or fractive pumping of wells that were
21 the source of contamination varied such that the
22 system was not always at a steady state for
23 contaminant concentration entering the water
24 treatment plants --

25 MS. BAUGHMAN: Objection to the form.

1 Q (BY MS. HORAN) -- then the samples
2 would not show a quantity of treatment losses?

3 MS. BAUGHMAN: Object.

4 Q (BY MS. HORAN) When I say the samples,
5 I mean the paired samples.

6 A That's speculative. There's certainly
7 that possibility.

8 MS. HORAN: I don't know that we need
9 to --

10 Q (BY MS. HORAN) I believe you testified
11 earlier that you had reviewed Dr. Longley's
12 expert report. He's the historian.

13 A Dr...

14 Q Longley. He's a historian.

15 A Yes. Yes.

16 MS. HORAN: We don't -- we don't see
17 this on the materials considered list.

18 MS. BAUGHMAN: I think he's confused. I
19 think he reviewed Brigham, and he's thinking
20 Longley. I -- I don't know that he's reviewed
21 Longley. I don't think he has.

22 MS. HORAN: Well, could you follow up
23 and follow up with us?

24 THE WITNESS: Longley's --

25 Q (BY MS. HORAN) The historian.

1 A Right.

2 Q Yeah.

3 MS. HORAN: Can we just -- can you just
4 follow up with us, Laura? We'll just find out.

5 MS. BAUGHMAN: Hold on. Okay. Are you
6 done?

7 MS. HORAN: Yeah. Nothing further.

8 MS. BAUGHMAN: Okay. I'll tell you, for
9 the record -- I've confirmed it -- he's never
10 been provided Longley. He's confused because
11 you're saying "historian".

12 THE REPORTER: We're still on?

13 MS. BAUGHMAN: Yes. We're still on.

14 He's confused because you're saying
15 historian, so he's assuming that's the historian
16 that he had reviewed. Okay? He reviewed
17 Brigham, and that's on the list.

18 MS. HORAN: We just wanted to understand
19 the --

20 MS. BAUGHMAN: So I'm not going to
21 supplement because --

22 MS. HORAN: That's fine.

23 FURTHER EXAMINATION

24 BY MS. BAUGHMAN:

25 Q How many -- let me -- I'm going to ask

1 you a few follow-ups.

2 How many different historian expert
3 reports did you review?

4 A One that I recall.

5 Q Okay. Was that Dr. Brigham?

6 A Yes.

7 Q Okay. So did you review Dr. Longley's
8 report?

9 A Not to my recollection.

10 Q Okay. Were you confused because she
11 used the word historian?

12 A Yeah. Historian. I mean....

13 Q Okay. Let me just ask you a couple of
14 other things.

15 So you have these paired samples that
16 you're relying on for your Opinion Number 2 which
17 also relate to your Opinion Number 1 which you
18 talked about earlier; right? Correct?

19 A Correct.

20 Q Okay. And you've been asked by defense
21 counsel some questions about, well, do you know
22 which wells were pumping and what if they
23 changed.

24 What's the likelihood that that wells
25 would be pumping differently on the same day such

1 that it would change the results?

2 MS. HORAN: Objection to form.

3 Q (BY MS. BAUGHMAN) What's your opinion
4 on that based on all the work --

5 A That seems --

6 Q -- based on all of the work you've done
7 and the documents you've reviewed?

8 MS. HORAN: Objection; foundation.

9 THE WITNESS: That would seem very
10 unlikely. Very unlikely.

11 Q (BY MS. BAUGHMAN) Does the concept that
12 the different wells could have been pumping at
13 different times on the same day change your
14 confidence in your reliance on the paired samples
15 to support your Opinions 1 and 2?

16 MS. HORAN: Objection to form.

17 THE WITNESS: No.

18 Q (BY MS. BAUGHMAN) And why is that?

19 A Just the unlikely nature in that it
20 would happen on each of those episodes and each
21 of those times.

22 Q (BY MS. BAUGHMAN) Okay.

23 MS. BAUGHMAN: I'll pass the witness.

24 MS. HORAN: Nothing.

25 MS. BAUGHMAN: Go ahead.

1 MS. HORAN: Nothing further.

2 Thank you, Dr. Sabatini, for your time
3 today.

4 THE WITNESS: Thank you.

5 THE VIDEOGRAPHER: We're off the record
6 at 6:19 p.m.

7 THE REPORTER: Can both of you right
8 here state just for the record, your order for
9 the transcript? Are you ordering the transcript?

10 MS. BAUGHMAN: Yes. But that's all with
11 Golkow, and there's a whole leadership committee.
12 So I want whatever we normally do. Okay.

13 MS. HORAN: Can we have a three-day
14 turnaround, please?

15 (Deposition concluded at 6:19 p.m.)
16
17
18
19
20
21
22
23
24
25

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

J U R A T

STATE OF OKLAHOMA)
) SS:
COUNTY OF _____)

I, DAVID ALLEN SABATINI, PH.D, PE,
BCEE, do hereby state under oath that I have read
the above and foregoing deposition in its
entirety, and that the same is a full, true, and
correct transcription of my testimony so given at
said time and place, except for the corrections
noted.

DAVID ALLEN SABATINI, PH.D, PE, BCEE

Subscribed and sworn to before me, a
Notary Public in and for the State of Oklahoma by
said witness, DAVID ALLEN SABATINI, PH.D, PE,
BCEE, on the _____ day of _____ 2025.

Notary Public in and for the
State of Oklahoma

My Commission Expires:_____

My Commission Number:_____

1 C O R R E C T I O N S H E E T
2 NAME: DAVID ALLEN SABATINI, PH.D., PE, BCEE
CASE: IN RE: CAMP LEJEUNE WATER LITIGATION
3 DATE: APRIL 11, 2025
REPORTER: LANA L. LEDFORD, CSR

4 PG/LN	CORRECTION	REASON FOR CORRECTION
5 -----	-----	-----
6 -----	-----	-----
7 -----	-----	-----
8 -----	-----	-----
9 -----	-----	-----
10 -----	-----	-----
11 -----	-----	-----
12 -----	-----	-----
13 -----	-----	-----
14 -----	-----	-----
15 -----	-----	-----
16 -----	-----	-----
17 -----	-----	-----
18 -----	-----	-----
19 -----	-----	-----
20 -----	-----	-----
21 -----	-----	-----
22 -----	-----	-----
23 -----	-----	-----
24 -----	-----	-----
25 -----	-----	-----

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

C E R T I F I C A T E

STATE OF OKLAHOMA)

) SS:

COUNTY OF OKLAHOMA)

I, Lana L. Ledford, a Certified Shorthand Reporter within and for the State of Oklahoma, certify that DAVID ALLEN SABATINI, PH.D, PE, BCEE was sworn to testify the truth; that the deposition was taken by me in stenotype and thereafter transcribed by computer, and is a true and correct transcript of the testimony of the witness; that the deposition was taken on APRIL 11, 2025, AT 120 NORTH ROBINSON AVENUE, 4TH FLOOR, OKLAHOMA CITY, OKLAHOMA 73102; that I am not an attorney for nor relative of either party, or otherwise interested in this action.

Witness my hand and seal of office on the 16TH day of APRIL 2025.

<%824,Signature%>

LANA L. LEDFORD, CSR
for the State of Oklahoma
CSR #01776

&	1	107:6 130:20	1100 2:8
& 2:4	1 3:15 4:3 16:8	131:5 137:19	111 208:3
0	16:10 19:22	152:10,18	112 260:3
0.008. 330:25	27:1 50:25	155:17 170:23	116 4:10
0000000010	57:11 68:2	201:13,19	11:00 95:11,13
104:7	132:20,21	202:11,15,23	11th 22:10
0000002424	137:16 141:4	202:25 204:8	12 4:16 30:22
62:9	142:18 143:4,9	207:16,20	30:23 31:9
0000002426	143:12 145:15	212:5 213:17	129:3,15,24
16:11	145:25 149:5	233:21 292:3,6	130:8,12
0000002426-...	149:12,16,22	296:21 297:5	131:25 132:23
4:3	150:1,5 156:12	300:19 301:8	143:15 215:20
0000003331-...	156:13 158:25	301:24	241:19,21
3:15	159:14,16	100 292:4	255:19 256:14
00000044016	164:9 178:4,19	10003 2:5	294:23 297:13
116:20	179:12,22	101 4:8	120 355:12
00000066207	290:17 334:15	104 4:9	129 298:5
207:18	334:23 335:3	105 4:21	12:05 146:16
0016 200:11	335:10 336:24	106 277:8,16,19	12:16 154:18
0046 189:12	337:1,5 338:7	277:24 278:2,5	154:19
190:10,20	338:7 339:6	279:1,17,23	12tdce 61:19
008 199:19	340:3 343:2	280:4,11,21	13 4:17 59:16
200:6 330:17	350:17 351:15	285:6,12	59:20 291:4,6
00897 1:5	1-1 124:24	107 277:19	14 4:18 27:12
207:18	126:1 343:16	285:12 286:12	132:3 227:21
0096 190:21	1-14-25 4:5	294:4,11	228:12 236:2
200:4	1-5 286:16	107s 288:10	238:18 242:17
01776 355:20	1.6 302:19	10:47 95:10,11	250:16 285:22
07-00000031...	303:1	11 1:16 4:15	300:7,9 325:11
101:21	1.7.15 236:8	5:6 6:3 30:21	325:15 326:4
	1/23 20:4	30:21 204:12	326:20 327:3
	10 4:14 59:16	229:14,15	336:19,20
	59:20 107:2,5	291:7 354:3	149 294:18,20
		355:12	295:5,7

<p>15 42:14 131:23 146:23 248:18 281:15 281:18,19 282:18 286:15 336:21,22 342:6 15-20 189:9 199:22 330:13 330:14 15-3 189:11 191:11 199:22 330:5,8 15-4 186:24 15-8 200:13,22 200:23 16 4:3 235:3,5 255:8 261:11 262:14 281:17 337:13,24 338:8,19 1632 7:6 16th 355:17 17 20:13 21:15 24:18 267:3 285:24 292:25 171 102:4 173 4:11 18 63:5 200:22 223:14 292:22 186 4:12 19 297:22 299:14,15 302:7 306:2</p>	<p>342:17 1941 150:17,21 151:7,11 1942 150:17 151:7 1950 116:9 1950s 50:1 1951 279:12,20 1953 273:13 295:21 296:2 1964 286:4 1965 293:12 1966 293:12 1968 289:7 295:4,12,17,22 296:2 298:9 1970 297:15,18 1970s 298:22 299:9 1971 296:23 297:7 1972 285:24 286:3,10,18 287:1 288:6,11 289:7 290:3,12 292:11 293:16 1980s 50:1 1981 37:1 1982 155:17 248:19 256:10 257:4 258:8 260:2 338:1,13 338:20 341:22 342:12</p>	<p>1984 248:19 249:6,17 252:12,13,15 252:16,19 342:10 1985 37:4 256:15 1987 116:9 141:24 273:13 1989 37:7 1990 169:24 170:17 171:15 190:18 198:19 204:6,16 1991 302:14 1999 298:15 299:15 1:16 154:19,21</p> <hr/> <p style="text-align: center;">2</p> <hr/> <p>2 4:4 27:8,9 34:21 50:16,25 54:7,21 59:12 59:12,16,20 66:16 89:5 100:12 123:8 128:10 141:5 145:20 149:10 149:20 158:12 159:16 178:2 179:23 190:16 235:3,7 236:4 271:19 278:7 288:22 307:20</p>	<p>319:15 336:3 336:11 337:13 337:18,22,23 350:16 351:15 2-4 152:22 154:4 2-5 344:4 2-8 332:23,24 332:25 2-9 152:21 153:8 154:5 2.3 344:5 2.4 153:7,7 2.58 190:16 20 4:8 42:13,14 68:2 79:11 102:4 146:24 292:3 297:22 298:18 300:20 301:8 310:21 315:11 332:7 200 249:13 251:24 20005 2:9 2000s 52:6 2004 230:13 327:9 332:10 333:5,6,13,17 343:11 2005 55:7 104:20 131:3 140:7 207:11 343:23 345:4,6</p>
--	--	---	---

<p>2007 55:2,8 2008 55:2 2009 55:8 208:1 2013 55:9 2023 15:2 16:2 17:11 18:4,7 25:11 2024 17:7 18:20 35:1 63:5 241:20 327:1 2025 1:16 4:6 5:6 6:3 17:9 18:12 24:5 27:12 28:15,18 29:14,19 34:13 291:7 305:18 322:5,16 324:23 325:11 325:12,15 326:4,20 327:3 327:11 331:24 333:13 353:18 354:3 355:12 355:17 207 4:14 21 29:19 118:14,16 288:8 303:21 342:15,17 212 2:5 22 152:12,17 298:8 307:12</p>	<p>307:21 308:12 315:11 229 4:15 23 4:21 15:3 17:9,9 25:9 291:18 298:14 299:14 300:12 300:14,15 24 303:21 304:5 241 4:16 2438 22:4,5 2443 16:12 25 104:8,22 108:3,25 109:11 241:20 303:25 304:5 304:21 332:8 25th 22:15 26 223:13 258:9,19 27 4:4 229:21 230:5 248:18 300:13,15 304:11,14 342:12 27601 2:11 27th 342:15 28 4:6 256:10 257:3 258:8 260:2 338:1,13 338:20 28th 22:19 256:5 341:21</p>	<p>29 292:14,18,19 291 4:17 29th 208:1 2:06 185:18,20 2o25 17:13</p> <hr/> <p style="text-align: center;">3</p> <hr/> <p>3 3:3 4:6 28:13 28:14 33:17 35:4 53:6 57:14 92:11 100:11 180:10 271:4 306:2 324:15,18 326:12 331:13 3-1 92:11 100:14,19 103:7 152:5 331:13,15 3-11 166:6,12 3-2 148:6 3-3 89:7,9 188:15,21 3-7 144:13 146:11 152:7 3-8 150:11,12 150:24,24,25 151:1 30 30:1,4,11,14 34:14 45:22 65:10,20 104:8 106:17,18 155:2 156:13 291:13 325:6</p>	<p>326:12 300 4:18 300,000 100:19 30th 208:1 31 104:8,17 106:6 229:18 230:7 310 2:11 3184 101:22 31st 23:5,11 32 131:23 280:6,6 324 3:7 33 291:8,13 317:20 318:5 318:12 337 3:15 345 3:8 353 3:9 354 3:10 355 3:11 3:21 241:14,15 3:34 241:15,17</p> <hr/> <p style="text-align: center;">4</p> <hr/> <p>4 3:4 4:7 55:5,6 62:6,7 145:5 164:23 213:6 237:1,18 238:3 238:9,18 239:7 239:11,16 240:12,18 242:5 248:19 249:6,17</p>
---	--	---	--

<p>252:11,16 255:11 261:20 302:19 303:1,4 307:11,21 315:13 325:15 342:10 4-1 144:23 145:5,16 146:1 147:25 149:1 153:16,19 160:24 161:1 161:10,16,25 162:21 163:16 164:4,22,23 165:3,23 166:3 4-2 144:24 146:4,5 161:1 161:3,4,5,5,12 161:25 162:3 162:12 163:15 164:10,22 165:24 166:4 168:1,4,7,12 333:16,17 334:7 336:8 4-3 145:17 149:17 159:21 160:15 164:4 164:23 168:2 335:16,24 4.1 149:11,25 150:4 4.2 159:20,23</p>	<p>4.3 160:1 4.4-1. 148:21 4.42 160:13 40 7:15,19 102:6 400 117:17 249:17,21 250:2 4017 117:13 4031 117:23 4038 116:21 42 150:21 151:11 43 23:3 24:13 46 249:11 250:6 251:23 4th 250:22 355:12</p>	<p>5.1 134:18 135:1,8 136:20 5.1. 140:14 5.2 158:13 159:3 264:14 264:18 5.2. 158:13 5.3 132:3 133:12,17 5.6 302:12 5.6. 302:8 5182 155:13 558-5915 2:5 58 190:12 324:10 59 260:7 5:02 302:2,3 5:12 302:3,5 5mgd 102:6</p>	<p>6.3. 133:10,17 60 255:19 260:1 606 256:21 339:12 347:1,3 62 4:7 6365 207:19 639 252:13,19 65 293:1 66 293:4 6:13 347:15,16 6:14 347:16,18 6:19 352:6,15</p>
			7
			<p>7 4:10 116:17 116:18,23,24 128:7,8,13 134:18 140:12 251:15 279:10 279:13 281:8 282:10 285:11 293:25 294:11 294:13 327:22 327:23 7.12 255:22 256:12 259:25 260:11,18 261:12,19,24 262:10 263:17 265:24 7.13 260:11 7.13. 260:20</p>

<p>7.14. 260:14 7.15 242:4,22 7.2 250:17,23 251:16,21 7.25 242:4 700 2:4 73069 7:7 73102 355:13 75 303:9 76 257:4 339:2 7:23 1:5 7th 293:4</p>	<p>155:2 156:13 158:12 186:13 186:15 189:7 294:17 296:7 296:10,11,21 297:3,4 324:23 325:1,6,12 326:12 327:1 330:4 90 131:4 208:17 209:7 96 200:5 99 299:13 9:03 1:16 6:4 9th 21:9 29:8 29:16 33:21</p>	<p>145:24 160:18 288:21 296:8 314:18,25 322:24 334:24 335:9 above 100:18 115:16 148:21 161:3,8 286:2 286:5 304:23 353:7 absence 162:10 314:17 336:10 absorb 222:4 absorption 224:15 absorptive 219:7 academy 49:19 accept 301:13 accommodate 195:15,20 287:17,20 account 149:6 179:18 182:10 185:23 186:7 199:15 205:14 228:15,22 253:1 264:2 312:8 315:16 319:5,10 321:22 330:3 344:16 345:7 accounted 234:4 235:22</p>	<p>240:7 265:21 312:13 315:19 accounting 265:5 accounts 56:4 56:15 315:3 accuracy 102:20 232:20 232:22 233:2 accurate 10:9 36:9 89:19 102:11 232:16 233:14 accurately 89:13 235:22 239:17 240:2 240:12,13,19 achieve 167:22 222:5 233:3 245:5 achieved 80:4 acknowledging 295:5 act 4:18 300:9 acting 119:4 action 355:15 actions 74:1,7 activated 224:3 224:10,11,11 224:13,16 active 224:20 actual 148:9 201:16 202:20 232:15,23</p>
8	a		
<p>8 4:11,11 29:12 140:23 156:12 156:14 173:23 173:25 174:1 200:7 293:19 293:20 340:13 340:20 8-4 241:24 800,000 103:24 82 257:5 339:3 342:16 824 355:18 84 241:23 85 178:24,25 181:9</p>	<p>a.m. 1:16 6:4 95:10,11,11,13 a1 293:24 294:4,11 295:5 296:16,22 297:15 299:1 299:18 als 298:21 299:8 a2 298:1,10 ability 9:21 56:6,16 57:19 172:13 287:16 able 17:6 49:6 54:14,15 110:18 144:5</p>		
9			
<p>9 4:12 19:25 28:18 29:13,14 30:1,4,13 32:3 34:14 141:20</p>			

actually 30:22 45:1 50:17 85:14 128:7 130:19 142:2 144:10 148:12 159:6,13 182:4 266:17 291:11 316:6 327:9 331:8	227:10 adds 318:1 adhesion 215:23 216:6 adjunct 36:3 adjust 309:6,6 313:9 adjusted 237:6 237:14 adjusting 303:7 310:17 adjustment 306:10 309:18 administrative 14:4 admittedly 248:24 adopt 158:22 158:25 adopted 159:12 adopting 131:8 131:13 238:10 238:24 239:2 advanced 43:20 advisable 201:17 202:21 advisors 49:17 aeration 138:23 203:23 208:19 311:6 311:12 318:16 330:24	affect 328:19 affidavit 288:20 299:2,6 affidavits 271:8 271:11 affixed 33:22 afternoon 11:19 age 6:18 agency 44:17 45:12 agitating 312:20 agitation 315:5 315:6,10,19 344:16,20 345:6 ago 7:16,19 12:23 15:1 25:13 26:5 42:13,14 45:22 45:23 123:19 154:24 180:14 184:22 327:14 agree 58:1 59:25 60:3,8 60:16 68:13,19 69:1,12,24 70:11,17 71:2 77:16 78:12 82:8 83:5,13 84:11,18,21,24 85:1,15 92:12 93:1,20 94:1	94:17,22 96:2 103:25 104:2 110:1,8,12,16 112:18,21,24 114:2 117:8 118:19 122:22 122:25 125:10 125:20 126:6 126:13,16 134:20 139:1 139:17 142:12 143:16 147:2 164:13 167:3 168:4,7,14 169:23 170:15 171:8,24 172:12 176:6 177:8 187:8,9 189:15 190:18 191:15 193:11 193:16,18 201:3,5,7,9,10 202:8 204:21 209:17,25 215:4,8 217:5 226:17,23 228:14,21,25 230:1 232:13 239:6,9 244:14 244:24 249:22 250:5 252:3 254:22 260:17 263:16 266:12 272:2,10
--	---	--	---

277:16,24	159:19 160:25	68:13,14,20	allen 7:1 353:5
278:2,12 279:3	166:6,25	69:3,9,10,11,13	353:13,17
280:10,21	169:25 170:2	69:17,25 70:4	354:2 355:6
281:4 285:6,13	170:18 171:6	70:5,6,12,13,14	allergies
285:16,19	172:21 182:5,6	70:18,23,25	176:23
287:1,19,23	197:15 198:15	71:3,7,15,23	allison 2:10
290:2 294:3,13	207:9 210:13	79:7,21 80:1	6:10
294:17,20	214:24 223:12	81:9 82:21	allison.o'leary
296:24 299:17	223:14,20	83:2,7,14,25	2:12
308:1 313:20	230:13 303:6	84:6 110:22	allow 119:9
319:25 320:21	323:5 327:6,9	111:3 115:23	149:5 244:7
321:5,7 322:1	327:17 329:24	118:10 119:17	288:1 334:15
341:19 347:19	331:17 332:10	168:9,15 169:6	334:22
agreed 5:2	332:21 333:6	172:1,4,5	allowed 23:14
171:9 272:9	333:17,25	175:25 176:1	105:19
agreeing 93:10	334:7 336:5	176:17 180:20	allowing 173:7
239:4	343:11,12,19	180:23 186:11	335:3
ah 10:19,25	344:7,12	187:10,22,24	allows 68:23
75:15 91:8,13	ah's 76:23	198:21 202:14	118:10 119:17
91:14,15,18,22	158:19,20,22	310:9,10	328:15
92:24 98:4,13	159:13	311:21 319:6	alluding 180:17
101:2,4,7	ahe 158:1	328:16,17,22	288:16
103:20 108:17	ahead 18:1	329:19 344:17	alluvial 37:21
123:6,11 124:8	20:21 21:17	al 54:20	alternatives
124:24 125:3,4	24:25 105:7	alachlor 37:20	189:22
125:10 126:6	106:1 114:9	alanna 2:8 6:8	ambient 79:20
130:19 131:2	120:14 184:1	alanna.r.horan	80:1 81:9
137:18 138:17	259:8 260:22	2:9	amend 48:22
139:1 142:17	351:25	alex 58:18	amended 28:17
143:3,7,10,14	air 43:7,8,9	align 103:6	324:19,22
147:2 148:17	47:11 64:10,11	allegations	346:12
149:23 150:19	64:12,12,18,18	12:20,25 13:15	american 42:3
151:9 158:5,14	66:24 67:3,5,6	alleged 272:22	amount 60:11
158:17 159:4	67:17,23,24	273:2	61:11 81:24

84:2,4,9 94:11 110:19 114:21 122:21 139:23 139:25 167:6 172:6 179:25 180:1 209:6 312:19,21 329:1,7,8 analogies 116:6 analogous 67:17 176:12 analogy 64:10 79:9 111:9 115:8,18 193:19 313:4,6 318:18 analyses 183:18,20 184:4,7,7 207:25 analysis 57:8 140:20 143:10 158:6 179:16 248:2 253:7 264:24 282:12 283:7 310:4 312:6,11 313:3 314:7 315:14 analytical 22:11 analyze 245:20 analyzing 244:2	answer 8:19 9:8,10,21 20:15,25 21:4 21:5,25 23:21 24:24 48:22 58:14 73:14 88:19 95:23 114:6 122:17 159:7,9 174:14 175:8 179:18 228:6 264:16 267:3,6 291:24 292:5 293:5,8 340:7 341:25 346:9 answer's 247:21 answered 170:9,13 233:18 252:7 265:10 307:4,7 321:25 answering 9:23 54:12 answers 180:9 anthracite 223:3,15,19,22 223:22 224:3,9 224:13 anticipate 24:8 77:3 anticipated 20:8	anticipating 221:13 antonucci 2:14 anwar 2:15 anyway 42:23 49:7 120:13 appear 149:4 334:14,22 appearance 247:1 appearances 6:5 appears 186:19 192:8 260:23 appendix 32:6 32:7,8,24 33:6 33:11,22 266:18 267:10 267:13,16,20 268:12 269:12 270:6,7,11 273:6 302:7 303:20 307:9 applicable 67:14,20,22 applications 330:1 applied 36:2 39:1,8 141:18 203:13,22,25 applies 21:25 87:21 apply 86:1,7,15 87:8 89:9	156:14 220:12 applying 201:15 202:19 303:3 approach 141:24 142:9 153:13,23,24 169:24,25 170:16,17 171:7,9,10 198:16 199:6 227:10 232:1 248:16 309:5 310:3,16 313:9 313:10 314:1 314:18,19 approaches 171:15 313:7 313:11 approaching 159:18 appropriate 150:9 171:8 175:23 189:23 189:25 313:6 343:20 approved 43:25 approximately 334:15 336:11 april 1:16 5:6 6:3 15:1,2 16:2 17:8 28:18 29:8,14,16
--	---	--	--

33:21 35:5 208:1 324:23 325:12 354:3 355:12,17 apt 313:4 aquifer 37:21 219:22 aral 25:23 archives 343:20 area 22:24 80:21 81:6 82:13 88:11,21 88:25 121:10 168:9,15,20,22 176:13 190:7 193:21 194:1 194:15 196:4,7 196:16,17 197:6 224:12 239:8 272:18 277:2,3,7 310:10 311:16 311:17,21 317:17 319:19 areas 136:19 argument 309:5 army 295:4 articles 35:3 aside 13:7 34:18 51:23 55:23 96:8 103:21 109:19	128:6 176:8 213:17 233:6 243:1 301:20 asked 9:17 46:16 55:3 59:4 65:15 66:12,19,22 72:8 74:7 96:1 105:10 131:4 170:10 213:4 232:3 233:17 252:6 254:18 265:9 268:13 307:3 321:25 328:2 330:11 330:16 342:9 350:20 asking 26:10,15 53:14 88:15 169:1,2 196:25 221:9 225:11 234:24 268:22 269:9 314:13 321:1 339:17 asks 17:24 228:6 aspect 48:9 110:14,15 260:24 320:13 321:17 aspects 39:1 assess 59:22 312:18	assessed 59:19 242:8 assessing 59:15 207:25 assessment 129:24 130:7 142:23 169:12 217:18 234:2 237:11 239:9 241:4 312:23 327:8 assessments 228:2 assigned 206:25 assist 125:5 273:11 343:20 assistant 38:6,9 associate 36:1 38:9 39:7 42:3 associated 10:15,16 77:1 168:22 193:22 218:2 283:19 associates 36:7 association 42:4 assume 10:4 27:18 134:16 158:5 201:17 202:21 218:14 236:17 306:7,7 319:7	assumed 134:17 166:15 166:25 179:16 179:18 186:5,9 202:9 203:5,14 204:1 227:6 308:23 309:13 309:19,24 319:11 assumes 182:14 246:20 assuming 90:9 105:5 221:7 223:9,21 306:2 310:6 349:15 assumption 167:24 197:15 204:15 221:10 303:11,15 assumptions 134:5,13,14,16 atmosphere 110:4,11 111:20 113:1 113:21 114:17 121:13,15,20 122:10,11 171:16,20 172:8,14,17 173:1,6 180:20 187:2 198:5 204:16 206:9 207:3
--	---	--	--

<p>atmospheric 109:23 112:22 172:4,5 atop 107:25 atrazine 37:20 atsdr 4:14 52:9 52:24 53:8,12 53:22 55:3 56:3,6,14 57:4 57:12,15,18 125:5 209:11 209:19 210:2 210:16,22 211:10 213:22 228:14,21 230:1,14,22,24 231:3,18 232:6 235:12,19,23 253:6 255:12 262:19 263:25 265:23 321:20 321:21 atsdr's 56:17 57:19 207:25 230:20 attach 266:22 308:11 attached 33:14 33:16,17 110:21 123:7,9 280:22 281:5 332:22 333:18 attempt 315:16 315:17</p>	<p>attended 31:15 31:22 76:3 attention 337:15 339:11 attorney 15:14 355:14 attorneys 5:4 23:25 26:11 attribute 169:19 attributed 159:4 296:23 attributes 160:25 atypical 108:2 august 155:17 285:24 286:3 author 35:11 53:13 339:13 339:17 340:3 authored 35:20 available 24:11 149:4 199:8 214:7,9,21,22 273:22 296:17 334:12,13,14 334:21,21,23 avenue 2:11 7:7 355:12 average 178:4 178:19 averaged 341:1 aware 17:12 51:25 141:23</p>	<p>142:9 147:19 270:16 271:12 273:5 275:10 276:3,4 291:1 293:10 b b 3:1,13 4:1 34:20 280:14 282:13 283:2 285:3 340:8 bachelor's 36:24 back 27:5 38:1 40:15 44:24 45:20 48:4 50:16 52:21 65:12 68:7,12 95:12,14 98:22 100:9 113:5 120:10,11 123:8 140:11 145:23,23 149:2,18 154:20 157:2 159:19 160:23 161:2,12 162:12,16,19 162:23 164:16 165:7,8 168:1 170:20 176:9 185:19 189:7 190:14 193:19 199:12 234:22</p>	<p>241:16 255:17 258:16 260:20 261:2 263:14 272:7 282:10 282:24 291:3 296:18,19 297:19,20 302:4 303:20 306:1 310:15 315:8 318:18 334:2 335:18 343:11 347:17 backed 165:11 165:16,19,21 background 11:4 51:1 66:9 75:25 155:7 156:7 259:21 273:17,20 326:14 backsplashing 288:4 backup 161:23 163:14 backwash 146:5 149:2 161:12,16,20 162:8,11,22 164:16 165:1,5 165:7 226:5 backwashed 146:2 161:21 162:2,5,15,18 162:25 163:9</p>
---	---	---	---

220:3	273:7,21	163:20 183:18	30:7,17 31:17
backwashing	287:12 330:2	184:4 205:22	32:19 33:1,12
146:7 161:1	343:12 344:9	206:8,23	33:15 34:2,15
163:5 220:7	344:22 351:4,6	214:20 215:2	36:15 40:8,19
bain 155:24	baseline 88:16	331:4 343:25	41:1 48:21
balance 166:19	bases 43:4 47:1	344:1	50:2 51:14,20
bank 65:12	47:10 73:8,22	basis 7:9 93:9	52:17 53:9,17
barrier 79:16	274:25	105:19 119:4	53:20,25 54:6
base 43:8,8	bash 2:17	192:13 288:19	54:11 56:10,20
46:25 47:4,9	basic 185:10	290:18 303:14	57:5,24 58:4
47:11,12,13,19	basin 63:24	bates 16:10,12	60:7,14,20
47:22 48:1,4	64:1,3,4,13,23	62:8 101:20,22	61:7,14 65:15
48:10 272:16	65:1,5,7 66:2	102:3 104:6,7	68:16,22 69:4
272:21 273:1	67:16 92:14	104:17 106:16	69:15,19 70:3
274:21 275:23	97:14 145:22	116:19,21	70:20 72:1
276:2 298:20	149:3,7,10	123:25 124:1,4	73:13,16,19
344:7,9	158:3 167:24	124:9 155:12	74:3,14 75:6
base's 282:3	183:13 205:22	207:17,19	75:21 76:15,21
based 8:7 13:20	206:3,11 207:2	326:10	77:19 78:16
76:22 109:16	208:18 209:6	bath 313:18,22	80:10,12,18
118:23 136:7	209:13,19	314:10,21	81:15 82:7,22
140:20 144:4,7	210:2,9,18	baughman 2:3	83:3,10,17
144:16 147:9	211:11,17,23	3:7 4:21 6:6,6	84:13,19 85:3
147:10 148:18	212:2,12,16	11:20 13:2,10	85:19 86:3,9
149:11,13	214:4,15 215:5	13:23 15:23	86:17,20,23
153:20 158:18	215:6,9,13,17	16:13,16,18	87:11,19 88:1
159:13 160:19	245:21 331:5	17:10,15,18,21	88:9,17,22
165:25 178:17	331:20,24	17:23 18:1,23	89:17,24 90:14
184:10 202:1	332:13 333:12	19:7,14,18	91:1,6,25 92:6
203:14 204:2	333:16,21	20:10,19,24	92:17 93:3,7
217:17,18	334:1,4,9,12	21:13 24:16,21	93:11,23 94:4
218:11 220:25	335:5,22 336:2	24:24 25:7	94:7,12,19,24
224:9 225:5,5	basins 66:6,13	26:12,15 27:4	95:22 96:10,18
271:20 272:17	114:25 158:8	27:22 29:21	96:24 97:10,19

98:1,9,14,21	143:21 144:2	216:16 217:12	270:12 272:4
99:9 100:7	144:19 146:19	218:10,17	273:14 278:23
101:1,14	147:6 149:14	219:2 220:5	287:22 289:16
102:13,21	150:3,23 151:2	221:6 222:18	290:10 294:7
103:11 104:12	151:14 153:14	222:25 223:24	299:10 301:18
104:18,23	153:21 154:2	224:6,22	304:8 305:24
105:9,15,17	154:22 155:16	225:18 226:20	307:3 308:3
106:3,9 107:10	156:19,21,25	227:2,8,15,18	309:2,16 310:1
107:15,20	159:8 160:3,9	228:5,8,17,24	310:12 311:14
108:8,14,19	160:16,22	229:11 231:4	313:23 314:11
109:4,14,24	162:9 163:6	231:14,21	314:22 318:25
110:24 112:15	164:18 165:13	232:8,17,24	319:17 320:2
113:3,11,15,23	169:8,18 170:5	233:15,22	320:10,24
114:3,14,18	170:9,19 171:2	234:23 235:24	321:24 322:17
115:6,25	171:4 174:5,8	236:18 237:8	323:11 324:8
116:12,22	174:12,25	237:20 238:4	324:12 326:17
118:21 119:12	175:6,10 177:6	238:13,20,25	329:6 330:8,15
119:25 120:8	177:11 180:18	239:19 240:4	331:12,23
121:1,22	181:6 182:12	240:23 241:12	332:3,20
122:13,18	183:23 184:1	243:13,17	335:15 336:13
125:16,21	185:11,14	247:6,17 248:5	336:16,17,20
126:3,11,17,25	188:2,9 189:17	248:11 250:10	336:22,25
127:13 129:5	191:17,22	250:18 251:19	337:4,8,11,12
129:19 130:1	192:9,15	252:6 253:4,15	338:5,16,18
130:15 131:10	193:17 194:5	253:23 254:5	339:10,16,22
131:12 132:11	195:23 196:12	254:14,20	340:1,2,9,23
132:18 133:2	200:22,24	258:10,20	341:25 344:2
133:22 134:10	201:8 202:13	259:12,19	345:14 346:5
134:22 135:5	203:9,18 204:4	262:2 263:2,8	346:20,24
135:16,24	205:25 209:8	263:20 264:5,8	347:9,11,12,25
136:13,22	209:21 210:4	264:15 265:2,9	348:3,18 349:5
137:6 139:4	210:11,20	265:16 266:1,8	349:8,13,20,24
140:3,19	211:5,13	266:25 268:2	351:3,11,18,22
141:11 142:25	213:24 215:10	269:22 270:2	351:23,25

352:10	223:15 227:24	199:5 206:14	89:10,15
bc 61:19	231:10 240:21	234:18 237:16	boiled 121:12
bcee 1:10 4:5,6	245:12 256:3	237:25 239:13	bolded 235:8
5:5 6:17 27:11	270:18 282:18	270:15,15	262:15 264:13
41:20,23 42:25	315:21 348:10	299:2,3	bolton 2:3 12:4
353:6,13,18	believed 131:8	bible 50:13	book 35:3,5,9
354:2 355:7	bell 15:5,12,17	big 164:4	35:11,13,17,20
bear 173:19	278:16,17	176:13 180:8	35:21 49:1,12
beds 166:14	benzine 61:19	180:15,16	49:17 268:3
173:9,11,15	133:17	196:17,17	books 267:25
220:3,9	bern 2:11	287:15	268:4
beginning 58:9	best 7:20 9:5,10	bigger 202:12	bottle 79:13,15
158:7 229:21	9:21 10:2	203:7	79:16,16,17
291:18 292:22	12:24 15:21	bill 18:3 23:25	80:8,16,22
begins 128:13	16:5 17:10	billed 18:11	81:7,9 82:1
140:23 200:15	18:5 25:17	24:5	111:11,18,24
208:5,10	29:4 30:18	billing 13:20	112:3,9,13,17
215:20 228:12	46:15 52:14	16:1,4 17:3,7	115:2,8,18
310:21	54:25 66:10	18:7,19 19:1,4	116:3,7
behalf 1:12 5:6	98:19 117:5	19:24 23:5,22	bottles 79:3
6:8	144:9 177:22	24:4	bottom 16:14
belief 150:1	198:2 199:7	biochars	30:21 90:10
264:25	228:5 248:2	218:22	148:2 242:17
believe 11:20	326:17	bit 58:6 79:1	279:15 300:17
12:7 13:14	better 141:24	97:12 118:4	308:18 336:11
23:19 34:21	142:9 171:10	146:18 224:8	341:15 343:16
35:2 38:11	betz 340:5,13	227:16	boulevard
49:10 67:12,18	341:8,14,19	bldg 4:8	72:14 77:18
92:24 115:1	betz's 340:10	blockage 335:6	78:14 145:19
124:13 146:13	beyond 11:9	board 41:24	149:9,17 160:8
156:17 178:11	127:2,17 128:5	bodies 87:17,24	160:15 164:7
178:11 185:21	129:21 130:10	88:6 205:3	242:9,23
186:2 188:15	138:9,14	body 86:1,7,13	335:18,22
203:4 220:22	157:18,19	86:15 87:7,9	336:9

break 58:3,10 58:15 78:25 95:5,11,20,25 146:17 154:19 156:17 157:13 176:25 185:12 185:18 227:14 241:11,15 301:24 302:3 breakdown 81:3 breaking 132:24 breaks 115:8 115:18 323:19 breeze 198:5,6 briefly 31:13 39:18,19 brigham 116:20 266:19 271:23 272:3,8 348:19 349:17 350:5 brigham's 272:7 bringing 226:24 broad 88:10 broadway 2:4 brought 165:7 bubbled 212:12 212:15 bubbles 215:16	bucket 82:20 83:1,6,8,13,15 83:24 84:3 85:11,13 89:20 89:25 bucket's 85:16 buffalo 32:8 73:3,5,12,21 118:17,20 176:10 266:15 267:17 273:11 275:1,8 276:2 276:5,13,22,24 277:18,21 278:3,12 279:4 280:12 281:23 285:8 286:11 287:2 290:4,13 291:21 292:9 294:5 295:23 296:4,5 299:23 301:9 303:22 304:1,14 305:8 305:12 306:9 306:25 307:2 308:19 309:23 311:6 312:16 313:1,21 314:8 315:23 316:4 318:21 328:4,8 buffaloes 60:18 61:10,12 116:8 117:9,11 119:1 119:22 120:4	266:5,20 269:7 271:23 272:16 273:12,21 274:15,17 275:5,23 284:3 289:8,15 290:19 292:11 293:11,16 295:13,18 297:24 298:2 298:10,16 300:19 301:16 302:8 303:3 304:7 305:18 310:23 311:3 315:15 316:23 319:6 328:10 build 49:7 163:25 building 99:13 99:15,19,22 102:4 buildings 48:6 built 7:23 185:6 344:10 bulk 166:16 215:25 216:7 bullet 64:19 66:16,21 68:7 68:12 131:22 buried 284:17 284:20	c c 2:1 3:1 7:6 55:1 118:1 188:13,16 189:2,4 280:18 280:21,25 281:1 354:1,1 355:1,1 cagiano 14:15 31:7 269:16 270:17 cagiano's 270:8 299:2,6 calculate 181:15,17 196:22 calculated 199:23,24 200:19 202:2 202:11,12 203:7,8 calculates 329:21 calculating 142:13 calculation 133:1 141:13 141:17 142:10 159:5 186:8 204:16 206:15 206:21,25 309:20 329:12
---	---	--	---

<p>calculations 22:11,16,20 75:16 76:13,18 76:22 77:5 93:24 119:1 131:24 132:4 134:6,8,15 135:21,25 136:7,10 140:21 158:15 158:23 159:13 167:25 173:16 173:18 182:11 185:23 186:3,6 190:12 195:13 197:9,25 199:15 201:15 202:19 204:7,9 250:15 251:20 254:9 302:8,12 304:24 305:3 308:24 309:14 309:17 317:24 318:10 327:8 328:8 333:23 343:6 344:22 345:11 calendar 17:7 18:4 calibrate 56:23 261:12 263:18 264:1 calibrated 237:12 242:9</p>	<p>260:12 320:15 320:22 321:6 321:13,20 calibration 234:6,10,17 235:10,18 236:9,11 237:2 237:18 238:3 238:10,19 239:7,11,16 240:13,18 242:5,22,25 255:11 256:1 260:13,18,23 261:3,15,20,25 262:5,11,18,25 263:5,7 264:11 265:1,4,12,14 265:15,20 319:14,16 320:8 321:16 california 43:9 44:8,22 47:3,9 call 23:6 24:13 31:20,23 61:23 145:23 194:3 205:1 called 15:15 271:2 calls 286:19 camp 1:3 4:18 14:6 39:17,22 46:6,9,13,17,20 48:11 51:3,11</p>	<p>51:18 52:1,10 56:19 57:22 60:5 66:8 67:14,20 68:5 72:10,19,21,25 74:2,8,11,18,21 75:3,12 76:10 76:14,20 90:25 91:5,20,23 92:4 93:17,21 94:2 96:7 100:8 116:9 120:16 125:4 125:14 126:10 126:23 127:5 128:18 156:8 171:17 172:19 172:24 173:9 173:15 178:19 179:7,12 181:4 182:3 204:14 205:9,23 206:4 206:18 207:13 209:20 210:3 211:12 216:12 216:15 218:7 228:15,22 248:3 259:3 271:24 272:21 273:3 291:22 292:25 297:23 299:2,7 300:9 304:7 327:5 343:17 344:15</p>	<p>354:2 cap 79:19 80:6 80:9,17,23 81:21 82:4 111:10,18 112:9,14 capacity 8:5 65:22 102:6 137:24 198:13 201:6 274:3,8 caps 116:14 caption 316:7 captured 239:17 240:19 captures 240:2 carbon 64:14 64:17 79:14,24 80:1,2 115:9 212:11,15 224:3,9,10,11 224:16,20 carbonaceous 224:14 carbonation 115:12 care 310:14 carefully 175:7 carolina 1:1 2:11 carrying 133:14 carter 49:23 case 1:5 8:6 12:9,12 13:1,9</p>
---	---	--	--

15:19,22 16:6 18:16 19:6 20:12 21:14 24:17 26:1 27:16 36:12,21 51:10 52:3 73:9 75:5 98:4 104:24 121:17 122:21 178:22 186:5,9 214:3 214:19 221:16 226:9,14 270:1 270:17 274:11 317:8,9 320:7 333:9 354:2 cases 85:5,6 87:21 193:13 265:21 295:7 category 312:22 cause 21:10 187:23 188:5 276:12 312:1 318:20 caused 233:13 334:1 causes 167:7 191:8 causing 169:21 169:21 328:22 caveat 115:7 156:11 center 141:15 152:9	certain 96:19 167:6 179:19 312:19 certainly 27:17 52:19 95:3 152:11,11 167:3 191:19 192:17 220:20 233:18 240:25 241:1 258:4 276:8 279:8 287:7,24 348:6 certificate 3:11 certification 42:2,25 certified 5:8 41:24 355:4 certify 355:6 cetera 84:7 131:16 208:25 212:1 344:1 chain 4:3 challenging 233:2 chance 174:21 323:3 change 69:2 181:4 293:15 297:16 328:8 351:1,13 changed 165:8 314:6 350:23 changes 34:25 68:15,21 77:4	96:16 319:5 changing 38:21 68:24 chapter 55:8,9 55:9 chapters 35:17 35:21 characterizati... 130:24 131:1,9 chart 118:5 133:8 252:18 check 242:16 chemical 39:14 166:21 184:13 224:18 246:1 246:11 chemicals 187:4 219:22 chemist 341:16 chemistry 130:3 chloride 245:22 choice 263:4 choose 167:9 167:18 198:7 choosing 131:17 198:18 chose 150:5 198:20 chris 62:16,18 62:19 67:18 68:8 213:5 church 50:13	circulation 118:10 119:17 cite 178:13 204:6 340:15 cited 30:14 339:6 345:20 city 1:14 5:7 47:11 62:20 284:11 355:13 civil 5:10 36:25 37:4,10,13,17 274:5,8 cl 4:3 16:11 62:9 claim 14:5 claiming 20:22 claims 13:9 clarification 10:4 158:21 clarified 158:22 clarify 10:2 78:10 87:4 clarifying 233:10 class 40:3 50:13 184:12 184:15,17,18 184:23 185:4 classes 38:16 38:18 184:10 211:24 cleaner 259:22 335:19 337:3
--	---	--	--

cleaning 43:20 cleanup 43:4 46:6,9,13,17,20 clear 24:17 32:20 66:13,22 108:11,13 161:24 164:21 171:18,25 clearly 146:6,6 climate 38:21 clja 3:15 101:21 cljs 32:5 clogging 220:4 close 47:25 110:18 closed 47:13,20 47:23 119:6,11 clw 99:1,3 177:14,17 181:7 256:21 325:19,20 326:4,18 346:16 clw00000051... 155:12 clw606 337:25 338:7,19 339:6 340:3 clws 98:15 cmo 21:14 267:3 co2 64:3,5 67:25 79:20	80:25 81:4 115:11 coarser 306:22 coefficient 189:13 190:11 197:20 198:2,9 198:19,21 199:9 203:14 203:23 204:1 330:20,24 coefficients 190:20 coke 79:3,9,12 79:13,19,23,25 80:6,15,22 81:7,13,19,20 82:1 111:9,11 111:18,23 112:3,13,17 115:2,8,18 116:3,6,7 colleague 6:10 39:12 colleagues 44:5 45:5 224:18 collected 178:22 255:24 collecting 268:10 collectively 61:18 color 4:9 column 252:12	combination 318:12 combined 168:24 169:2 come 13:18 39:10 130:13 132:16 211:2 225:8,16 282:18 283:25 288:1 308:12 308:17 comes 88:11 92:2 167:5 187:15 194:18 318:18 comfortable 265:18 coming 133:25 167:5,16 192:2 245:23 246:8 246:12,21 247:12 284:21 344:12 comment 34:6 51:2 102:16 109:6,17 138:14 141:14 163:7 227:25 310:14 312:20 321:15 323:2 344:19 commented 259:4	commenting 32:5 58:21 59:1,8 comments 220:12 226:12 340:20 345:1 commission 353:21,22 committee 352:11 common 65:13 65:18 79:6 communication 14:22 20:20 21:5 communicati... 20:13,25 21:11 21:24 24:19 companies 39:14 company 39:11 45:1,2 comparable 192:21 compare 158:14,17 192:19 260:2 312:12 compared 160:7,14 252:18 260:3 260:12 306:15 316:9,11
--	--	---	--

comparing 111:17 249:16 250:20 342:25	213:18 229:19 230:8 235:6 236:3 242:1	242:3 243:6,12 255:24	343:19
comparison 246:14 256:25	243:2 260:8 277:15 285:23	concept 87:21 225:1 243:21 243:23 244:5	conference 26:5
comparisons 342:3	292:21 293:22 294:24 300:16	351:11	confidence 351:14
compete 46:12	307:10 325:3	concepts 188:11	confident 77:5
competed 44:14	331:14 332:24 333:19 337:14	concern 8:2 61:17,23 173:20	confirm 68:10 150:1
complains 155:25	component 118:6 120:3	conclude 142:17	confirmed 66:23 149:15 150:4 349:9
complaint 12:11,14,16,17 12:19 13:7	components 120:6 132:25 133:4	concluded 352:15	conform 243:14
complete 9:7,8 9:14 28:1 69:11 267:22	compounds 219:7 220:20 222:10	conclusion 100:24 193:13 231:19 251:13 282:19 293:15	confuse 306:11 confused 225:6 348:18 349:10 349:14 350:10
completely 172:8,11 182:15	comprehensive 32:21 34:7	conclusions 230:12 268:12 343:13 344:13	confusion 155:1
completion 23:18	computed 255:23	345:7	conjecture 254:9
complies 23:4 27:3 28:12 34:19 51:24 55:24 59:13 100:13 103:22 106:20 108:5 109:20 117:24 125:1 128:11 138:18 168:3 170:24 186:25 189:10 200:14	computer 355:9	condition 165:9 169:21	conservative 142:1 226:24 315:17
	concentration 79:24,25 90:19 122:6 166:16 166:18 187:23 246:2,11,12 247:3 250:2 347:23	conditions 66:6 140:4 148:16 193:5 195:2 196:25 208:25 209:13 243:19 245:7 247:24 335:14	consider 22:11 99:17 118:25 130:4 131:6 137:7,8,15 195:14,19 198:12 230:15 230:21,24 231:11,16 235:12 262:19 312:21
	concentrations 22:16 98:25 122:1,4 236:7	conducted 208:23 322:15	

<p>consideration 181:22 231:12 240:9 247:9 312:5 345:10</p> <p>considered 28:17,25 29:11 30:4,23 32:11 32:17,17,24 33:7,11,22 34:3 40:24 42:7 53:1 137:18 154:25 155:3 198:23 205:8 210:10 210:18 211:10 234:21 235:19 240:22 255:13 264:22 314:14 324:19,22 325:2 346:13 348:17</p> <p>consisted 223:13</p> <p>consistent 68:14,20 69:13 69:18,25 70:19 275:22 315:24 346:3</p> <p>constant 80:2 110:5,11 113:2 113:22 114:17 246:8,9,10 247:12</p>	<p>constants 200:20 202:3</p> <p>constitutes 49:2</p> <p>constricted 144:6 148:12 160:4 323:4</p> <p>constriction 145:2,22 149:19 161:23 162:1,11 163:4 163:8,10,25 169:20 334:1</p> <p>consultants 125:3,11 126:7 230:13</p> <p>consulted 185:8</p> <p>consulting 185:7</p> <p>contact 14:13 168:9,16 169:6</p> <p>contacted 15:8 15:9,10 52:3</p> <p>contain 218:15</p> <p>contained 98:19 267:10</p> <p>container 152:18</p> <p>contaminant 46:6,9,13,16,20 56:7,18 57:20 166:17 233:12 347:23</p>	<p>contaminants 51:3,10,18 61:17,23 62:3 208:22 232:15 232:23 246:21</p> <p>contaminated 39:22 51:5 77:18 78:15 253:14,22 254:12,23 255:3 259:24</p> <p>contamination 13:25 14:1 43:21 47:17 48:7,8 173:7 272:22 273:2 347:21</p> <p>context 130:9 138:1 199:5 320:5 337:17 337:21</p> <p>continue 23:11 119:5,10 122:1 122:3</p> <p>continued 23:15</p> <p>continues 201:11</p> <p>continuously 70:7 248:15</p> <p>contract 36:18 36:20 125:5 150:6</p>	<p>contracted 36:12</p> <p>contrast 67:16 128:25 171:17</p> <p>contribute 205:23 206:4</p> <p>control 90:7 340:11</p> <p>controlled 83:9 83:16 84:9,12 85:25 86:6,12 87:6,16 88:5 89:23 111:2</p> <p>convenience 287:5,9</p> <p>converges 141:14</p> <p>conversation 62:16</p> <p>conversations 267:2,7 269:9</p> <p>coprecipitant 222:15 224:24</p> <p>coprecipitating 225:2</p> <p>coprecipitation 222:13,23</p> <p>copy 40:5 156:6,16 337:6</p> <p>correct 12:10 18:7 19:6 21:16 36:5 37:2,5,8 41:11 41:12,22 43:4</p>
---	--	---	---

43:5 45:9,10	176:20 177:10	330:20,21	328:1 330:10
51:7,8,13,15,19	188:8,17 189:5	331:6,18,20,21	342:9 346:12
51:21 52:8	189:6,13 191:9	337:19,23	350:21
56:9 57:10,12	191:10,16	338:13,24,25	counsel's
57:15,16 58:18	192:6 199:16	339:7,8 341:17	328:25
59:9,10,21,23	199:17 204:11	341:18,24	count 159:10
59:24 60:6	205:19 215:6	342:1,4,8,22,23	counted 264:20
61:15 63:6	228:16 233:14	350:18,19	countering
64:24 67:1,8	255:6 262:12	353:9 355:10	241:7
69:14 71:9,18	262:13,22	corrected	counters 240:8
72:16,23 73:1	263:23 265:1	158:17,20	country 48:5
76:4,5,7,8,11	266:10,15,16	159:12	county 353:3
76:11 77:15	269:2 274:5,6	correction 3:10	355:3
78:2 79:18,21	276:6,11	19:17 354:4,4	couple 35:16
79:22 80:5	277:25 278:1,5	corrections	207:6 350:13
86:2,8,16 87:8	278:14,15	9:17 28:7	course 38:19,23
90:8 91:17	280:4 285:5,9	353:10	38:24,25 39:11
92:18,22 93:22	285:9,14,15,20	correctly 66:25	39:14 41:8,9
96:9,17,23	286:12 288:14	89:19 125:8	47:13,15 104:4
109:23 111:11	288:15,17,18	142:4 166:2	137:18 140:24
112:19,20,23	288:25 289:1,4	171:21 196:14	177:12,25
113:10 115:24	289:5,11 290:6	220:24 230:18	241:12 274:14
116:5,7 120:21	290:16 293:5	235:15 255:15	288:7
123:13,16,16	294:6,9,12,15	262:21 282:4	courses 39:15
128:16,20	294:16,18	295:9 298:23	48:25 50:6,8
130:9 133:18	296:5,6,8	counsel 6:4	50:12 274:12
141:7 142:3,5	297:24 299:20	11:13,17,22	court 1:1 6:15
142:11,16,21	300:2,3 302:12	15:18 19:9	8:17 9:2,6 12:5
142:24 143:1	302:13,16	20:14,20,25	73:16 105:2,18
143:18 150:18	303:4,12,13,19	21:5,11,25	127:25 128:4
152:14,14	304:4 310:24	104:19 124:16	cover 27:17
159:17 163:11	311:3,22,23	124:21 267:2,8	172:9 281:10
170:1,18	318:11 321:14	268:17,25	285:17,18
171:11,22	322:13 328:5	269:10 323:20	286:6,12,20

<p>288:13 289:9 289:15 290:5 290:21 294:6 294:15 303:23 304:17,23 310:21 313:21 covered 171:19 180:22 204:14 cow 259:3 create 168:15 169:6 194:18 244:6 317:13 318:15 created 334:1 creates 167:16 168:12 208:20 311:17 creating 163:25 335:5 creation 169:3 169:15 crestmont 7:6 critical 173:16 173:17 crosstalk 58:23 138:10 213:15 214:12 crust 160:6,12 160:20 csr 1:22 354:3 355:19,20 curious 68:10 245:17</p>	<p>current 7:2,3 currently 7:8 63:2,2 cut 80:7,15 117:2 cv 1:5 cycle 165:5</p> <hr/> <p>d</p> <hr/> <p>d 4:6 123:9,12 d.wre 4:16 dacw5603r10... 125:5 daily 192:13 315:14 damage 8:2,3 damaged 295:8 295:13,19 data 178:21,23 179:2 201:14 226:18 227:1,5 227:7 231:17 233:2,25 234:12,20 236:7 237:1,7 237:15 239:15 239:25 240:12 240:17 241:9 242:4,6,7,21 248:25 249:16 250:25 251:4,5 251:7,9,21,21 252:16 254:10 254:19 256:5</p>	<p>256:12 260:17 261:11,19,24 262:10,24 263:13,17 265:1,23 289:12 305:6 310:14 327:7 dataset 248:25 256:9 260:13 datasets 248:18 date 6:3 23:18 35:5 174:5,7 256:17,23 299:12 327:1,2 354:3 dated 28:18 241:20 324:23 dates 35:17 david 1:10 4:4 4:6 5:5 6:2,17 7:1 27:11 28:16 41:19 291:6 353:5,13 353:17 354:2 355:6 davis 26:7 day 21:20 22:1 39:11 90:25 91:5,20,24 115:22 175:16 177:9 178:19 179:6 181:3 182:3 192:1,7 193:9 194:18</p>	<p>195:10,16,21 196:3,10 212:6 260:1 318:22 318:23,24 319:3 339:4 342:21 350:25 351:13 352:13 353:18 355:17 days 39:14 114:12 177:14 177:14 178:1,3 254:4 deal 40:14 dean 12:4 deanna 2:14 debris 290:1 306:21 decades 327:14 333:2,13 decay 218:22 december 17:9 18:20 23:5,11 35:1 63:5 248:19 249:6 249:17 250:21 252:11,16 295:4,12,17,21 296:2 327:1 342:10 decide 33:10 34:13 146:22 decision 149:16 199:1 230:4,15 230:20,24</p>
--	--	---	--

<p>231:11 decrease 254:24 255:5 decreasing 148:13 dee 4:16 deem 94:8 deep 102:6 deeper 335:19 defective 295:8 295:14,19 defendants 2:7 defense 45:13 45:16 328:1,25 330:10 342:9 350:20 defer 19:8 99:16 201:4 319:18,19 320:12,20 321:4,16 define 114:20 129:2 133:20 243:22 320:17 defined 134:1 definitively 168:24 degree 36:24 37:3 49:2 61:6 61:8 69:5,7 81:2,2 96:19 96:25 97:20 98:2 126:19 167:8,10,17</p>	<p>172:16 192:17 311:15 312:2 degrees 30:12 31:10,11 delivery 51:5 delta 188:13,16 188:18 189:1,4 dem 146:6 demonstrate 44:2 242:4 demonstrates 57:7 236:8 238:18 255:12 demonstrating 146:6 demonstration 44:11 335:17 dennis 2:16 denotion 256:15 department 45:13,13,16 46:1 depend 121:6 316:18 dependent 110:15 122:15 depending 126:19 219:19 depends 49:4 83:19 88:23,25 96:11 114:19 116:13 137:20 167:2 187:14</p>	<p>191:23 192:16 219:15 232:20 233:24 244:17 244:25 245:4 247:22 311:15 deposed 7:14 7:15 8:10 270:17,24 271:13 deposes 6:18 deposit 160:7,7 160:12,14 deposition 1:10 4:17 5:4 6:2 7:17,21 9:14 10:13 11:3,7 11:12 28:4 31:3,6 56:1 59:5 76:3 140:25 175:11 207:6 269:19 269:25 270:9 270:23 271:6 271:15 290:24 291:6 299:6 305:6 319:23 322:3,5,8 352:15 353:7 355:8,11 depositions 11:8 30:24 31:5,8,15 155:11 269:15 272:17 325:23</p>	<p>325:25 326:3 326:19 depth 182:19 185:23 186:4 describe 42:1 43:18,23 89:3 92:3 98:18 144:12 177:21 described 47:1 92:7 111:14 142:7 161:24 286:7 293:25 describing 83:22 97:5 312:3 description 3:14 4:2 100:3 118:9 164:10 164:12 344:7 descriptions 344:5 design 97:4 99:24 100:5 167:11 184:5 184:11 297:15 344:10 designated 288:23 designation 42:6 117:12 designed 184:8 185:5 205:23 206:4,18,24 216:25 316:15</p>
--	---	---	---

designing 185:9	149:11,22 181:24 220:16	180:16 196:1 224:2,11 341:9	diffusion's 84:25
detail 31:13 35:16 52:20 53:8,24,25 55:15,17	230:2 299:22 313:1 314:4,7	341:13,20 342:13	dike 7:23
details 45:22 55:13 84:1 88:19 102:24 121:5	determines 138:8,11	differences 303:10 314:17	diluted 246:16
detention 114:25 181:21 181:24 206:10	determining 138:1 143:4 181:23 211:11 232:22 289:14 299:21	different 78:6 79:14 80:22 81:5 108:18 116:3 120:1 156:22 167:23 170:10 213:9 220:20 244:1 259:23 284:7 350:2 351:12 351:13	dimension 148:10
determination 130:13 189:21 198:14 269:5	detracted 48:6	differently 197:16 350:25	dimensions 183:12 212:4
determinations 150:10	develop 273:19 320:18	differs 141:3	dioxide 64:14 64:17 79:14,25 80:1,2 115:9 212:11,15
determine 56:7 56:17 57:20 110:17 119:23 137:12 143:8 153:3 172:24 189:11 195:8 197:10,11 198:1,1 206:21 208:24 209:19 210:3 232:14 234:20 258:15 297:17 300:4 310:5 311:24 313:3 335:13	developed 43:24 149:1 161:11 162:15	diffuse 187:9 187:12,18,21 187:25 188:7 221:22	direct 4:10 209:17 210:1 236:15 285:7 306:19
determinations 150:10	developing 43:20 343:18	diffusion 82:17 83:9,16 84:12 84:15,16,22,24 85:21,22,25 86:6,12 87:6 87:16 88:5 89:23 90:4,6 90:21 96:16 187:3	directed 241:3 293:24
determine 56:7 56:17 57:20 110:17 119:23 137:12 143:8 153:3 172:24 189:11 195:8 197:10,11 198:1,1 206:21 208:24 209:19 210:3 232:14 234:20 258:15 297:17 300:4 310:5 311:24 313:3 335:13	development 163:11 168:5 343:21	diffusion 82:17 83:9,16 84:12 84:15,16,22,24 85:21,22,25 86:6,12 87:6 87:16 88:5 89:23 90:4,6 90:21 96:16 187:3	directly 30:14 36:12,22,23 67:21 211:10 228:15,22 229:2 303:11 303:17
determinations 150:10	devin 2:3 12:4	diffusion 82:17 83:9,16 84:12 84:15,16,22,24 85:21,22,25 86:6,12 87:6 87:16 88:5 89:23 90:4,6 90:21 96:16 187:3	director 36:1 39:8 62:19 63:3
diameter 143:15 146:14 152:10 309:7 318:13	dictates 122:10		directs 294:5 294:14
diameter 143:15 146:14 152:10 309:7 318:13	differ 197:24		dis 38:3
difference 82:12 84:10 111:18 115:17 141:17 160:25 161:25 180:7,8			disagree 80:19 87:14 113:24 141:10 142:14 174:23 197:19

<p>209:5 271:22 301:7 disagreed 175:5 disagreement 60:10 61:4,10 111:16 113:7 discernment 160:19 disclosed 155:18,20 disclosing 267:7 discontinued 333:2 discoverable 20:14 discuss 342:6 343:24 discussed 157:18 206:14 271:21 discussing 201:23 337:18 discussion 113:5 148:20 196:24 197:24 257:13 304:12 322:9 discussions 323:23 disparity 204:14</p>	<p>disputing 135:21 disruptions 344:1 dissipate 110:3 110:10 112:25 113:20 dissolve 64:14 212:23 dissolved 89:21 225:25 226:2 distance 305:5 306:11 distinct 320:8 distribution 51:4 56:5 60:2 60:5 78:7 103:18 120:18 128:18 135:12 136:21 230:16 237:6,15 255:14 264:4 282:3 284:5,9 284:13,16,19 284:21 286:23 distributions 135:3 district 1:1,1 divide 196:15 divided 196:4 division 1:2 doctor 129:13 document 12:19,21 13:4</p>	<p>13:7 16:10 18:25 19:2,11 19:20 22:4 27:10,18 28:15 28:20 40:12,13 62:8 66:15 101:19,25 103:13 108:4 116:19 117:1,3 118:23 125:23 126:14 143:23 155:12,15 156:2,5,16 158:7 173:25 174:3,13,16,19 175:16,21 177:21,23 178:6,7,13,17 186:17,19 201:4,5 207:17 223:5 241:10 259:9 269:6 270:4,6 271:2 326:5,6,19 328:6 333:10 336:6 337:25 339:13,20 340:10 341:15 346:16,25 347:3,10 documentation 268:11 271:21 273:10 289:21 295:11,16</p>	<p>298:25 322:20 346:7 documented 91:8 144:9 documents 11:2 18:10 29:5,25 32:18 34:14 53:10 75:16 78:22 98:18 101:12 101:16 155:2 155:25 156:3 156:12,13 172:22 210:8 210:17 214:21 214:22 268:14 268:16,18,24 269:3 273:16 273:22 274:14 288:5 299:7 325:6,10,16 326:11,12,21 346:14 351:7 doing 24:8 123:10 157:17 182:10 197:9 197:25 199:14 241:2,6 315:14 319:20 doj 2:14,15,15 18:20 dominant 217:3</p>
---	---	---	--

<p>double 242:16 doubles 159:17 doubt 102:10 102:20 dover 43:8,22 44:19 47:2,8 downstream 145:2,21 149:3 149:7 169:20 256:15,22 257:17,20 277:5 334:9,11 downward 306:2 dr 6:11,12,24 10:25 11:9 17:2 20:12 21:3,19 25:23 25:25 26:2 28:19 31:2 32:7 54:5 58:18,21 59:1 59:8,15,19,22 59:25 60:3,11 60:16 61:4,10 62:10 75:10 76:2,3,6 95:14 101:11,23 104:10,20 105:10 109:8 131:23 134:6 134:13,15 141:3,5,9,17 142:12 155:5</p>	<p>155:20 157:2 158:14 166:8 168:18 169:23 170:15 171:9 171:24 174:2 175:13 184:19 185:21 186:16 189:15 190:11 197:19 199:7 200:6 204:7 207:21 209:4,5 209:11 211:9 251:14 266:13 272:2 275:13 300:11 301:7 301:21 302:11 305:10,17 319:22,25 322:4,10,14,25 324:4,13 327:2 329:11 330:17 331:1 333:10 340:2 345:1,5 348:11,13 350:5,7 352:2 drafted 18:21 dramatically 114:22,23 213:9 224:15 drawings 344:11 drawn 96:14 97:18</p>	<p>drilled 112:7,8 112:14 115:2 drinking 4:11 14:1 51:5 138:4 174:1 232:12 289:18 drone 154:1 drop 142:18 145:20,25 152:13,17 dropping 71:16 148:7 drops 71:24 drs 271:22 dry 259:22 drying 173:8 173:11,15 dual 223:12 due 82:17 162:1 303:10 317:21 318:6 duly 6:18 dumping 283:16 duplicative 156:12 dyes 37:21</p>	<p>e.g. 166:13 171:16 earlier 23:18 124:13 155:18 166:8 186:2 200:1 233:7 245:12 267:4 274:20 275:22 281:23 288:10 288:24 290:3 315:21 316:2 319:13 321:10 321:11 322:2 328:24 346:21 348:11 350:18 early 12:15 52:6 289:23 295:4 ease 287:13 easier 167:25 287:14 eastern 1:1 edge 141:16 edited 35:20 edition 286:3,4 286:19 edits 302:17,24 education 48:15,19 49:25 273:9 effect 80:8 159:18 319:8,9 efficient 308:22 309:13,24</p>
e			
			<p>e 2:1,1 3:1,1,13 4:1,1,1 7:6 15:16 340:8 354:1,1,1 355:1,1</p>

<p>efficiently 306:15</p> <p>effluent 138:22 139:3,19 140:1 141:4 142:19 142:23 143:15 147:4 148:10 148:25 150:16 151:7 152:1,9 152:15 153:2 158:3 160:6,13 160:21 161:10 161:17 163:22 164:6 165:6,12 165:17 166:17 334:2,18</p> <p>effort 34:7 343:19</p> <p>efforts 125:7,14 125:25 126:9 126:22 129:22</p> <p>eight 177:25 178:3</p> <p>eisenhower 49:23 50:3</p> <p>either 39:15 42:6 98:18 124:11 173:22 210:6 259:5 265:20 271:16 304:20 306:16 306:17 316:20 317:7 355:14</p>	<p>element 226:24 307:14,17</p> <p>elevated 8:1 103:14,17 283:14,20 284:1,7,10,12 284:17</p> <p>elevation 158:2</p> <p>elevations 177:24</p> <p>else's 130:24</p> <p>email 4:3 14:10 14:15,18,22 155:23 275:14</p> <p>emeritus 7:10 38:12,13 40:18 40:19,20 184:16</p> <p>eminence 42:8</p> <p>emphasis 37:11</p> <p>employed 26:18</p> <p>emptied 180:5</p> <p>empty 147:22 147:24 148:10 148:14,19 180:6 323:3 335:8</p> <p>enclosed 66:23 68:9</p> <p>encourage 70:7</p> <p>encroaching 7:24</p>	<p>ended 13:11 253:17,25</p> <p>ends 120:18</p> <p>energy 45:14 46:1 71:20 167:7 334:24</p> <p>engineer 41:11 41:14,17,21,25 49:16 99:16 137:25 185:7 204:25 274:3,5 274:9</p> <p>engineering 35:7 36:25 37:4,10,13,14 37:14,15,16,17 37:18 42:4,24 49:1,18 50:9 183:13 184:6 195:12 197:13 205:2 224:18</p> <p>engineers 150:8</p> <p>enmeshed 225:21</p> <p>ensminger 14:19 301:3</p> <p>ensuring 225:14</p> <p>enter 69:9</p> <p>entering 248:6 248:9 347:23</p> <p>enters 90:24 91:4 97:12</p>	<p>183:5</p> <p>entire 32:25 97:7 111:15 308:13</p> <p>entirety 353:8</p> <p>entities 36:21</p> <p>entity 36:14</p> <p>entrance 305:9</p> <p>entries 22:6</p> <p>entry 22:10,15 22:19 23:5 24:13</p> <p>environmental 10:20,25 37:11 37:15,17 41:25 42:4 44:17 45:2 91:13,14 91:16,19,22 98:5,13 101:2 101:4,9 103:20 123:6,11 124:8 124:25 125:3 125:10 126:7 130:19 131:2 138:17 139:1 142:17 143:3 143:14 147:3 148:17 149:23 150:20 151:10 158:14 159:4 159:20 166:7 166:25 169:25 170:2,18 171:7 172:21 182:5,6</p>
--	--	--	--

<p>197:15 198:15 201:16 202:20 207:9 210:13 214:24 230:13 331:17 332:11 332:21 environment... 143:8,10 158:17 envision 85:5 225:20,24 301:11 epa 4:11 45:9 173:25 314:20 epidemiologi... 125:7,14 126:10,23 127:11 epidemiologi... 234:1 episodes 351:20 equal 80:1 166:17 equalize 176:1 176:14 equally 265:18 equation 89:7,9 166:22 187:15 188:14,15,20 188:21,23 189:2 equilibrate 81:21 82:6</p>	<p>114:16 equilibrium 79:14,20 80:4 81:8 110:3,10 110:17,18,21 111:2 113:1,20 122:1,4,5 329:22,23 330:1 equipment 279:23 280:4 298:9 equipped 295:5 equity 38:20 equivalent 82:19,24 286:21 era 49:11,12 eras 49:13 ernest 4:17 14:10,12 31:6 291:6 error 200:18 201:12 202:2,4 202:6,7 204:24 errors 204:17 escape 69:10 70:14 71:8,10 71:15 328:16 328:16 especially 326:10 essentially 122:9,12</p>	<p>142:12 280:11 283:16 established 289:2 estimate 15:21 131:24 132:23 141:25 144:7 251:15,20 estimated 141:25 144:15 146:12 147:5 148:18 166:18 318:23 estimates 190:17 202:7 202:25 232:11 343:18,21 estimation 125:11 126:7 147:13 150:2 217:16 estimations 345:12 et 54:20 84:7 131:16 208:25 212:1 344:1 ethiopia 36:3 evaluating 343:25 evened 319:11 eventually 81:8 120:18 evidence 145:2 149:18 251:10</p>	<p>251:12,12 257:15 310:15 344:20 evidenced 139:16,18 ewri 4:16 exactly 53:16 75:23 144:11 178:8 305:14 322:22 323:16 exam 42:7 examination 3:6,7,8 6:22 324:11 345:16 349:23 examinations 344:10 examining 72:18 example 8:19 82:9,25 92:11 137:16 148:6 189:16 201:12 201:24 203:14 204:2 247:4 313:13 examples 304:10 except 135:2,11 136:20 197:19 306:9 353:10 exception 155:9,11 156:2 156:2</p>
--	---	---	---

<p>exceptions 193:15</p> <p>exchange 66:24 67:3 68:13,14 68:20 69:3,11 69:13,18,25 70:4,12,18 71:3 172:1 176:17</p> <p>exclude 104:24 105:4,24</p> <p>excluding 57:25</p> <p>exclusive 15:17</p> <p>excuse 200:4 299:6</p> <p>exhibit 16:8,9 19:22 27:1,8,9 28:13,14 33:17 34:20,21 50:16 50:25 51:22 53:6 59:12 62:6,7 89:5 100:12 101:17 101:19 103:14 103:21 104:6,9 105:25 116:17 116:18 123:8,9 123:12 128:9 158:12 173:23 173:25 186:13 186:15 189:7 207:16,20 213:6,17</p>	<p>229:13,15 235:3 241:19 241:21 255:19 271:4 291:4,5 300:7,8 324:15 324:18 326:12 327:22 330:4 336:15,18,24 337:1,5,13 338:6,7 339:6 340:3</p> <p>exhibits 3:3,4</p> <p>exist 17:13 155:10 156:3 325:23 326:4</p> <p>exits 91:19,23</p> <p>expect 67:21 106:24 107:13 107:25 177:13 218:4,4,12,23 218:24 219:5 250:13 254:3 276:15 277:4 316:15</p> <p>expectation 221:2 276:7</p> <p>expected 67:22</p> <p>experience 51:1 69:3 172:1 191:16,20 217:21 250:1 273:8 274:17 289:22</p>	<p>experienced 81:12 123:3 142:2</p> <p>experiment 10:23 312:4,13 318:19</p> <p>experimental 320:18</p> <p>experiments 200:17 306:8</p> <p>expert 4:3,4,6 4:16 8:6 10:14 10:18,24 11:14 12:8 16:11 18:21 19:2,5 19:16 20:14 26:10,23 27:10 27:15 28:16 29:3 34:12,21 55:7,8 58:17 59:15 62:9 91:11 98:3,12 99:5 127:23 128:5 130:20 131:3 139:11 140:7 172:20 178:10 207:11 207:24 214:2 230:14 232:1 234:18 236:5 241:19 259:10 259:11 265:8 266:22,23 267:11 270:25</p>	<p>275:11 304:25 319:23 343:23 344:19,23,24 344:25 348:12 350:2</p> <p>expertise 127:3 130:10 138:14 239:8</p> <p>experts 24:21 25:19 269:10 319:19 320:20 321:4</p> <p>expires 353:21</p> <p>explain 83:24 105:19 154:2</p> <p>explained 231:12</p> <p>explanation 224:17</p> <p>explicitly 229:4</p> <p>exponent 158:18</p> <p>exposed 121:13 121:14,19 122:11 329:19</p> <p>exposure 14:2 56:8,18 57:21 129:17 130:9 138:2,8 232:15 232:23 233:12</p> <p>exposures 127:8,10,12</p> <p>expressed 166:21</p>
--	---	--	---

<p>extended 81:10 extension 23:13 extensive 76:23 extent 20:15 21:20,23 57:6 104:19 111:19 127:8 130:5 132:19 228:13 267:1 344:14 extreme 329:8 extremely 167:4 194:20 224:12</p>	<p>180:13 198:7 315:20 345:9 facts 314:5,6 failed 41:16 fair 9:3,4,12,13 9:24 10:6,7 16:2 18:22 19:3,17 23:16 23:22 28:25 29:20 30:16 32:13 33:24 47:20 51:12 52:7 57:4,23 60:13,19 61:13 62:4 63:5 70:21 71:12 72:15 74:13 77:10,14 80:3 80:11 81:1,14 107:19 115:5 120:20,25 121:9,16,21 124:7 129:4,18 132:5,9,17 134:3,9 135:4 135:15 136:23 137:5 140:2,18 140:21 141:6 142:15,20 147:5,13,20 152:13,20 157:22 158:16 158:24 172:15 187:13,20</p>	<p>188:1,4 190:13 191:2,3,5,13,14 191:21 192:5,8 192:10,14 195:11 197:4 197:20 199:11 200:8,9,11,12 202:4 203:17 204:10 216:1,9 216:10 219:23 219:24 229:3 230:25 233:21 234:17 236:16 237:3 242:15 245:15 248:22 249:3,19 250:9 252:5,8 253:3 260:5 261:5,8 261:9,21 262:1 262:9 263:1 268:1 269:1,17 276:14,20 277:1,22,23 282:15,21 285:18 286:24 289:10 290:9 290:15 293:13 295:25 296:1 297:9,10 298:3 298:12 299:19 299:24,25 302:9,10,21 303:18 304:3 304:18 305:19</p>	<p>308:20,21 309:1 311:8,13 317:23 318:17 320:23 322:12 325:22 fairly 188:11 247:24 faith 50:10 fall 56:23 82:4 141:4,8 142:23 143:4,9,12 144:6,15 145:3 145:20 146:12 147:4 148:1,5 148:9,13 149:5 149:8,12,16,19 150:5 151:21 151:25 153:3,9 153:20 157:14 158:25 159:14 159:16 164:5 164:21,22 165:10,16,20 165:23 166:3 168:22 169:12 202:9 203:6 302:18,25 303:10,11,17 304:24 306:11 306:12,12,13 318:1,13 323:4 323:9 327:16 329:14 334:3 334:15,22,25</p>
f			
<p>f 3:1,13,13 55:1 355:1 facial 88:21 facilitate 208:21 fact 236:5 255:10 292:8 304:22 315:22 330:17 335:9 factor 180:2,15 180:25 201:13 201:19,19 202:15,23,23 203:16 204:3 205:17 221:18 factored 198:25 factors 83:19 83:20 90:17</p>			

335:3,9,20,25 336:3 falling 138:22 317:22 318:6 falls 149:10 176:2,22 336:11 familiar 102:1 102:2 117:7 124:5,6 174:4 188:22 207:13 243:20,23,24 244:5 family 51:6 family's 157:7 fan 67:7 70:24 far 147:19 148:1 214:3 329:23 330:1 farmer 7:23 8:3 fast 181:11 301:14 faster 84:18,22 84:25 85:2,17 121:14,19 187:9 188:6 fate 51:2,10,17 248:20 faucet 313:12 313:18 favorites 157:7 faye 54:20,21 february 75:9 75:11 104:20	305:11,18,20 322:5,16 fed 10:21 281:25 282:7 282:14,20 283:9,12,24 284:10 288:25 federal 5:9 feeds 181:25 feel 16:21 56:1 197:14 264:21 266:9 feet 141:5 149:10,20 178:2 179:23 180:10 196:5,5 212:8,9 304:23 336:11 fellow 4:16 felt 76:23 131:16 327:6 327:10 ferguson 2:19 fewer 161:22 field 44:1,11,16 137:13 147:18 211:24 269:10 318:22 fifteen 146:24 fifth 64:19 figure 100:14 100:19 103:7 134:18 135:1,8 136:20 140:14	144:23 145:5 146:1 147:25 148:6,21 149:17 150:4 150:24 151:5 152:5,16,21 153:7,8,16,19 154:4,7 159:20 159:23 160:1 160:13,24 161:5,10,12,16 162:2,21 164:3 164:9,10,23 165:3,23,24 166:4 168:1,4 168:7 242:4 260:11,14 278:7 279:10 279:15 280:3 282:12,25 285:3,24 293:25 294:10 294:13 296:21 297:5 298:8,14 299:14 303:21 303:25 304:5,5 304:11,14,21 307:11,20,21 331:13,15 335:16,24 figure's 92:23 figures 143:11 145:11	file 19:5,15 filed 19:12,15 filing 29:18 346:15 fill 23:1 275:8 275:24 276:6,9 278:6 279:4 280:11 281:9 281:25 283:17 284:24 285:4,8 285:25 286:5 287:10,24 289:18 294:14 299:21,23 300:4,19 301:8 301:17 304:22 305:8 308:11 315:7 317:15 filled 100:20 157:21 195:9 266:15 271:23 272:5,6,11,16 272:19 273:12 275:2,3,24 276:2,5 278:3 278:13,22 282:1 284:4 285:19 287:2 288:13 289:8 289:15 290:20 291:2,21 292:9 292:11 293:11 293:17 294:21 301:16 303:22
--	---	--	---

304:1,15	316:25 317:20	314:18,25	204:12 227:23
305:12 310:24	318:5	349:4	230:9 255:9
311:3,7 313:2	film 87:20 89:3	finding 64:6	260:9 261:11
328:16,17	90:5,6 187:15	findings 339:1	266:17 270:21
filler 116:14	188:13 189:2	fine 8:25	271:20 277:8
119:3 277:25	filter 146:5	188:21 306:22	281:20,20
278:6,18,21	149:2 161:12	349:22	296:7,16
279:1,4 280:22	161:20 162:1	finer 220:7	297:14 298:19
281:5,10	162:15,18,25	finish 9:9	324:14 325:4
284:15 285:13	163:9 164:16	114:14 171:4	330:23 332:25
285:20 286:6	165:1,7 166:14	183:24 257:22	339:11,12
287:3,7,16,16	220:3,9 223:3	264:16 323:22	fit 99:22 237:6
287:19,25	223:12,13,16	finished 54:11	242:8
288:20,22	223:19 316:15	92:15 100:20	fits 49:21
289:2 290:8,14	filter's 161:21	144:19 166:14	five 45:22
293:25 294:18	163:23	174:10 264:15	103:1,3 265:10
295:24 297:12	filtered 161:17	finishes 73:14	fizz 79:24
309:20	filters 92:15	159:8	flat 79:21,23
filling 61:12	94:2,6 103:4	fire 272:13,15	81:13,21
73:21 273:11	146:2,8 161:1	275:25 276:5	flip 27:13,19
276:13,21,23	163:25 334:6	304:15,15	325:7
279:11,17	final 125:2	first 6:14,18	flooding 7:24
281:22 286:11	236:10 266:5	11:14 12:8	floor 312:1,20
286:20 287:6	finalize 23:10	19:22 24:15	315:9 318:20
289:25 290:4,7	finalized 18:21	25:3 29:23,25	355:13
290:13,19	finalizing 23:6	51:25 53:13	flow 82:10,10
293:23 294:5	231:9 234:7,9	102:3,25 107:3	96:15,16
294:11 295:23	234:13 325:18	107:5 123:17	110:22 111:3
296:4 304:6	find 16:5 17:7	125:2 126:1	120:15 145:24
305:7 306:9	42:18,20	128:12 131:22	167:4,7 181:23
308:18 309:9	123:21 141:4	166:12,20	182:22 183:15
310:20 312:9	148:20 173:14	171:13 174:19	191:16,21,24
312:16 313:20	173:22 214:8	175:10,22	192:19,23
314:8,9,21	215:1 298:25	178:5,7 187:1	193:10 194:11

194:11,23,24 195:1,3,6,17,22 195:24 196:2,3 196:4,4,6,11,15 196:17,25 197:10 198:22 208:25 246:8 246:10 276:10 276:12,17,17 276:24 277:6 282:2 283:15 286:22 301:14 317:14 328:22 336:1 flower 191:8 flowing 86:1,7 86:16 87:8,18 87:25 88:7 97:22 116:6 141:16 144:5 145:17 147:23 163:20 167:23 180:23 181:12 191:4,8 193:20 198:5,6 215:13 280:15 281:12 281:24,24 282:6,19 283:5 283:21 284:23 288:24 289:3 334:5,19 335:6 335:13 flows 120:16,17 182:2,22,25	183:1 192:8,12 192:12 193:9 194:16 284:12 287:17 fluctuate 99:7 115:22 fluctuation 177:9,15 178:4 178:18 179:6 179:17,20,23 179:25 180:2,7 180:11 fluctuations 178:2 179:12 182:19 185:24 186:4 192:14 248:13 fluorescent 37:20 focus 130:3,5 234:12 319:21 345:11 focused 52:13 127:15 320:13 321:17 follow 40:12 348:22,23 349:4 350:1 followed 198:16 209:11 270:23 309:5 310:3,3,16 following 228:13 301:5	312:6 follows 6:20 166:22 foot 141:4 142:18 143:5,9 143:12 145:15 145:20,25 149:5,12,16,22 150:1,5 152:10 152:12,17,18 158:25 159:14 159:16,16 178:4,19 179:12,22 334:16,23 335:4,10 336:3 force 43:7,8 47:11 69:3 71:21 forced 66:24 67:3,5,6 68:13 68:14,19 69:12 69:17,24 70:4 70:12,18,23 71:1,2,19 72:6 161:22 176:22 forcefully 93:14,18 forcing 70:25 foregoing 353:7 forget 144:11 forgotten 214:16	form 13:2,10 14:22 15:23 18:23 19:7,14 29:21 30:7,17 31:17 33:1,12 33:15 34:15 36:15 41:2 50:2 51:14,20 52:18 54:1 56:10,20 57:5 57:24 60:7,14 60:20 61:7,14 68:16,22 69:4 69:15,19 70:3 70:20 72:1 74:3,14 75:6 75:21 76:15,21 77:19,23 78:16 80:10,12,18 81:15 82:7,22 83:3,10,17 84:13,19 85:3 85:19 86:3,9 86:17,21 87:19 88:1,17,22 89:17,24 90:14 91:1,6,25 92:6 92:17 93:3,7 93:11,23 94:4 94:7,12,19,24 96:10,18,24 97:10,19 98:1 98:9,14,21 99:9 100:7
---	--	---	---

101:1,14	160:16,22	239:19 240:4	343:14 346:5
102:13,21	162:9 163:6	240:23 243:13	347:25 351:2
103:11 104:12	164:18 165:13	243:17 247:6	351:16
104:18 105:14	169:8,18 170:6	247:17 248:5	formal 48:18
106:9 107:10	170:19 174:25	248:11 250:10	formed 148:25
107:20 108:8	175:6 177:11	250:18 251:19	161:9 162:18
108:19 109:4	180:18 181:6	252:6 253:4,15	former 185:8
109:14,24	182:12 188:2,9	253:23 254:14	formerly 62:20
110:24 112:15	189:17 191:17	258:10,20	forming 267:24
113:3,11,23	191:22 192:9	259:15,19	269:13
114:3,18 115:6	192:15 193:17	262:2 263:2,8	forms 120:2
115:25 116:12	194:5 195:23	263:20 264:5	formula 209:19
118:21 119:12	196:12 201:8	265:2,9,16	210:2,16,23,23
119:25 120:8	202:13 203:9	266:1,25 268:2	211:2
121:1,22	203:18 204:4	268:11 269:23	formulation
122:13,18	205:25 209:8	270:2,12 272:4	35:6
125:16 126:11	209:21 210:4	273:14 278:23	forward 133:14
126:17,25	210:11,20,25	287:22 289:16	found 79:15
127:13 129:5	211:7,13	290:10 294:7	199:9 295:8,11
129:19 130:1	213:24 215:10	299:10 301:18	295:16,19
130:15 131:10	216:16 217:12	304:8 305:24	299:7 313:8,8
131:12 132:12	218:10,17	308:3 309:2,16	313:17
132:18 133:2	219:2 220:5	310:1,12	foundation
133:22 134:10	221:6 222:18	311:14 313:23	77:24 78:17
134:22 135:5	222:25 223:24	314:11,22	102:14,22
135:16,24	224:22 225:18	318:25 319:17	104:13 105:10
136:13,22	226:20 227:8	320:2,10,24	105:14 106:10
137:6 139:4	228:17,24	321:24 322:17	107:11,21
140:3,19	231:4,14,21	323:11 329:5	108:9,20
141:11 142:25	232:8,17,24	331:22,25	109:15 118:22
143:21 144:2	233:15,22	332:16 335:11	119:13 121:2
147:6 149:14	235:24 237:8	338:3,14 339:9	121:23 125:17
150:3 151:14	237:20 238:4	339:14,23	126:12,18
153:21 160:3,9	238:13,25	340:18 341:23	127:1,14

129:20 144:3 147:7 151:15 160:17 182:13 209:22 210:12 210:21,25 211:8,14 218:18 219:3 223:25 225:19 226:21 231:5 232:9,18,25 233:16,23 237:9,21 238:5 238:14 240:5 247:7,18 250:11 253:16 253:24 254:15 258:11 259:15 259:20 262:3 263:3,21 265:3 309:3 314:23 320:3,11,25 321:25 322:18 326:13 332:1 332:17 339:15 340:19 351:8 four 103:14 177:24 181:8 252:7 291:15 fraction 166:21 fractive 347:20 free 16:21 56:1 145:17 164:5 164:21,22 165:10,16,20	165:23 166:3 168:22 280:15 281:12,24,24 282:6,19 283:5 283:21 284:23 288:24 289:3 freely 145:24 front 41:20 50:18,20 53:7 118:17 134:19 188:24 189:3 258:24 277:9 full 6:25 38:7 38:10 83:25 141:21 166:12 169:14,16 171:14 174:19 180:6 187:1 204:12 230:10 242:2 255:10 260:10 271:20 281:21 334:19 337:16,25 353:8 fully 59:6 83:8 83:16 84:12 322:21,24 fulvic 218:21 function 88:12 fundamental 39:1 188:11 fundamentals 38:19	funded 44:16 funding 44:21 45:8,11 46:1 further 3:8 83:24 118:4 204:8 248:25 289:20 343:24 345:16 349:7 349:23 352:1 future 24:9 <hr/> g <hr/> g 4:1,12 186:14 gain 42:5,8 75:19 gaining 48:8 gallon 100:19 117:17 gallons 195:16 195:21 196:3 196:10 212:5 gas 208:19,25 general 11:4 25:5 44:25 66:6,9 79:12 82:8 83:4 100:1 106:15 107:1 109:25 121:24 175:1 188:3 193:6,11 205:4 259:21 273:15 315:4 generalized 170:16 171:10	generally 13:8 13:21 27:24 133:23 191:6,6 193:16 247:23 247:23 296:13 generic 232:19 generously 130:22 geotechnical 37:14 germany 47:12 47:16 getting 88:14 288:9 giovanni 2:14 give 10:9 101:23 147:24 156:6,16 224:12,17 246:18 337:11 344:2 given 9:15 50:7 50:8 75:16 110:15,16 113:14 114:20 114:22 122:16 122:20 204:13 323:17 329:1 353:9 gives 181:9 196:5 giving 15:21 glanced 58:19
---	---	--	---

<p>go 7:9,11 11:13 18:1 20:21 21:17,20 24:25 27:5 39:7,12 39:12 53:10 58:5,6 65:12 68:24 70:13 71:7 74:11,23 75:12 79:1,21 80:25 81:21 98:22 100:9 105:7 106:1 114:4,9 120:10 120:10,13 131:21 144:10 144:23 146:18 146:21,23 147:14,18 149:8,16 153:1 154:15 157:13 157:17 163:13 163:24 167:7 170:20 180:13 184:1 185:15 224:8 227:16 228:4,9 244:7 259:8 260:22 263:14 268:10 306:16,17 308:17 319:7 319:12 327:4 334:25 343:11 347:13 351:25</p>	<p>goal 64:7 212:23 goes 69:9,10 70:9,25 71:4 71:20 92:2,12 116:4 131:5 172:3,5 180:25 244:21 284:14 going 20:11 33:18 34:4 47:3 50:24 58:2,5 67:5 68:7,12 71:7 71:23 77:16 86:20 105:4,23 126:4 127:17 132:11 147:1 170:5 174:12 192:3 224:8 227:13,19 229:11 240:15 246:10,16 260:20 300:15 301:22 316:19 317:7,17 337:15 338:5 349:20,25 golkow 352:11 good 6:11,12 6:24 8:23 58:5 58:16 62:5 78:25 95:21 154:12 157:4,8 227:13 233:4</p>	<p>233:19 235:1 goodness 42:12 242:8 google 268:19 gotcha 238:20 govern 122:1,3 government 3:4 16:8 27:8 28:13 45:12 62:6 101:17,19 104:9 116:17 156:5 173:23 173:25 186:15 207:20 229:15 241:19,21 291:4 300:7 governs 122:5 grad 26:20 gradient 144:6 187:24 188:13 189:1 gradually 254:24 255:5 graduates 49:19 granger 155:16 grant 44:15 45:15,19 46:1 46:12 49:22 granted 105:5 105:6 132:13 grants 45:11</p>	<p>gravel 223:14 gravity 92:14 97:22,23 146:2 281:25 282:7 282:14,20 283:8,12,24 284:10,13 great 54:19 186:21 196:18 233:9 259:1 greater 149:5 191:9,13 215:12 310:8,9 310:10 329:9 334:15,22 335:3,10 greatest 162:24 165:5 grid 306:22 317:12 ground 284:17 groundwater 13:25 43:21 45:17 46:3,5,8 47:17 51:11 218:3,11 221:14 244:2 group 15:6,12 15:17 36:14 guess 34:5 42:22 48:24 49:3,7 50:4 55:5 81:16 98:24 119:18</p>
---	---	---	---

<p>128:7 152:3 178:17 179:17 182:5 217:13 229:4 231:6,15 233:24 245:17 266:7 273:24 274:11 291:9 291:16 guesstimate 212:10 guidelines 294:8 guiding 66:7 gun 292:17</p>	<p>242:22 244:12 248:6,9,20 250:23 251:2 262:17 264:24 300:19 301:9 322:11 323:1 331:5,15 332:12 333:24 335:2 338:12 342:4,14,21 343:1 half 24:12 39:11,13 117:17 162:13 301:23 304:1 318:23 hand 74:16 173:3 278:6 288:25 289:24 314:2 338:6 355:16 handed 346:20 346:25 handful 124:14 handing 101:18 104:5 207:16 handle 64:16 67:15 232:11 301:14 hands 336:15 347:10 handwritten 4:7</p>	<p>happen 20:7 71:21 127:17 135:22 176:17 311:10 329:22 351:20 happened 217:15 221:15 297:17 happening 52:1 52:5 70:8 happens 70:5 71:3,19 happy 53:3 58:10 103:8 hard 54:3,8 73:17 102:16 121:3,4 122:24 137:20 192:25 193:5 194:20 212:22 213:3 304:19 harder 163:13 168:23 317:10 317:15 hardness 217:1 217:20 haroon 2:15 hat 224:2 hatch 277:25 278:3,7,13,21 279:1,4,5 280:22 281:6 281:10,25 283:17 284:15</p>	<p>285:13,20 286:6 287:3,7 287:16,17,19 287:25 288:20 288:22 289:3 290:8,14 293:25 294:18 294:21 295:24 297:12 301:17 309:20 havai 2:14 head 8:20 79:13 81:5 90:23 113:9 115:9,15 123:14 126:3 149:4 151:8 166:11 181:15 181:16 196:23 231:1 254:1 258:13 264:7,8 296:19 334:12 334:14,21,21 334:23 346:1 health 138:3,12 hear 176:23 heard 170:7 heat 82:10,10 82:17 83:8,16 84:11 85:1,16 heavier 160:12 heavy 160:6 height 141:4,8 142:23 143:4,9</p>
h			
<p>h 3:13 4:1 354:1 hadnot 4:8 22:24 23:1 55:18 72:13 77:8,13 92:20 98:8 100:15,25 102:4,11 103:18,23 134:20 135:2 145:1,21 147:3 149:13 150:15 151:5 160:6,12 164:6,9 196:20 197:7 226:10 226:15 235:9 236:5,11,25 237:18 242:6,9</p>			

143:13 144:7 144:15 145:3 145:20 146:12 147:4 148:6,9 148:13 149:5,8 149:13,16,19 150:5 151:21 152:1 153:3,9 153:20 158:25 159:14,16 169:13 302:18 302:25 303:10 303:11,17 304:24 306:11 306:12,12 318:1 323:4,9 327:16 329:14 334:3,15,22,25 335:3,9,20 336:3 heights 306:13 help 9:22 26:9 26:16 47:25 48:9 90:21 176:14 268:14 343:6,9 helped 269:6 312:8 helpful 65:2 hennet 2:17 32:1 59:25 60:3,11,17 61:4,10 64:8,8 75:23 76:7,25	92:25 94:9 104:7,20 105:10 131:15 134:6,13 141:5 142:12 158:19 170:3 171:9 189:15 197:15 197:19 198:15 199:7 200:6 206:25 209:4 266:13,19 271:22 272:2 302:11 305:17 309:7,20 310:3 310:16 315:13 322:25 329:11 329:24 330:17 331:1 hennet's 10:18 10:25 11:6,9 31:3 59:15,19 59:22 67:16 75:8,11 76:3 101:11 128:25 130:17 131:24 134:15 141:3,9 141:17 158:14 158:20 169:23 170:15 173:22 190:11 204:7 214:24 226:13 240:7,8 241:3 241:7 305:6,10 309:5 313:9,25	314:19 322:4 322:10,14 327:2,7 333:11 henry's 79:4 80:2 110:4,11 113:2,21 114:17 121:25 122:3,5,10 329:21 hereto 5:3 hesitant 13:4 high 64:12 67:24 196:11 199:25 201:18 202:22 203:1 204:17 224:12 282:1,2 287:17 higher 142:1 187:24 200:3 250:13 257:17 257:23 276:10 276:12,24 310:8 317:19 318:4,15,23 319:8 highest 199:8 200:10 highlight 55:10 highlighted 279:22 307:12 highly 222:10 276:19 289:18 hill 43:7,17 44:12 47:2,8	hist 48:13 historian 275:11 348:12 348:14,25 349:11,15,15 350:2,11,12 historic 56:7,17 57:20 historical 48:19 49:25 267:25 268:3,7 271:21 273:10 274:13 history 48:16 48:17,25 49:4 49:6,13,14,20 50:6,12,14 268:4,5 274:1 274:12 301:4 hits 148:2 hitting 188:11 312:1,19 315:9 318:19 hld 35:7 hobby 274:11 holcomb 72:13 77:17 78:14 145:19 149:9 149:17 160:8 160:14 164:7 242:9,23 335:18,22 336:9 hold 20:10 24:16 229:12
--	--	---	---

267:11 349:5	53:16,19,21,22	105:8 106:2,4	154:9,15
hole 80:22 81:1	54:4,10,17	106:5,12	155:14 156:15
81:7 112:8,9	56:13,25 57:9	107:12,17,22	156:20,24
112:11,14,16	58:2,8 59:1,7	108:12,17,21	157:1,2 159:15
115:2	60:10,16,23	109:7,18 110:1	160:5,11,20
holes 307:17,22	61:9,16 62:7	111:1 112:18	161:2 162:12
307:23 308:13	65:19 68:18	113:7,12,18	163:10 164:24
308:16 315:24	69:1,6,17,21	114:1,6,15,23	165:15 169:11
316:9,16 317:5	70:11,21 71:5	115:10 116:2	169:22 170:13
317:12,12,16	72:7 73:20	116:18,23,25	170:22 171:6
home 48:5 63:8	74:5,17 75:10	118:25 119:15	173:24 174:7,9
82:11,13,14,25	76:1,17 77:7	120:5,12 121:6	174:18 175:3,9
homes 120:19	77:21 78:4,20	121:25 122:16	175:12,13
135:3	80:11,14,20	122:22 125:19	177:8,17 181:2
hope 75:19	81:18 82:9,24	125:24 126:4,6	181:11 182:17
157:4,5	83:5,12,20	126:15,21	184:3 185:13
horan 2:8 3:6,8	84:17,21 85:9	127:4,19 129:8	185:15,21
6:8,8,11,13,23	85:24 86:5,11	129:23 130:6	186:16 188:5
13:6,13 14:3	87:2,12,23	130:23 131:11	188:12 189:19
16:1,9,20 17:5	88:4,15,20	131:18 132:15	191:20 192:1
18:2,3,9,11	89:1,20 90:2	132:22 133:5	192:11,18
19:1,10,17,19	90:16 91:3	134:1,12,25	193:23 194:8
20:22 21:2,3	92:3,9,19 93:5	135:7,19 136:3	196:1,13
21:18,19 24:10	93:9,16 94:1,6	136:15,23	200:23 201:3
24:12 25:3,10	94:10,13,22	137:3,11	201:11 202:17
26:20 27:9,24	95:1,14,25	138:12,16	203:12,19
28:2,14 29:23	96:13,20 97:1	139:17 140:5	204:6 206:2
30:10,20 31:19	97:16,23 98:3	140:22 141:19	207:21 209:10
32:22 33:3,13	98:12,17 99:4	143:2,24	209:25 210:7
33:19,20 34:9	99:12 100:8	144:14,21	210:15 211:1,9
34:17 36:17	101:3,18,23	146:25 147:11	211:16 214:2
40:14,17,20,22	102:18,25	149:21 150:11	214:14 215:14
41:5 49:9 50:5	103:13 104:5	150:25 151:4	216:18 217:17
51:16,22 52:23	104:10,16	151:17 153:18	218:14,24

219:9 220:11	278:25 288:3	284:14 304:16	290:18 291:6
221:9 222:22	290:2,12 291:5	304:22 308:11	292:8 293:10
223:2 224:5,19	294:10 299:14	316:11	hunt's 269:19
224:24 225:23	300:8 301:20	hour 7:17	269:24 288:20
226:23 227:6	301:22 302:6	11:19 58:3	290:24
227:12,20	304:13 306:1	177:24 181:8	hydrant 275:25
228:11,20	307:6,8 308:5	301:23	276:5 304:15
229:2,13,17	309:8,10,21	hours 11:18	304:16
231:10,18	310:4,19	15:22 16:2,5	hydrants
232:2,13,21	311:20 314:3	18:15 20:3	272:13,15
233:5,20 234:3	314:13 315:2	177:14 254:4	hydraulic
235:1,2 236:1	319:3,22 320:7	324:9	163:1 183:18
236:21 237:13	320:15 321:3	houses 135:13	183:20,21
238:1,8,17,21	322:2,23	hpia 22:20,23	184:4,7 194:6
238:23 239:3	323:14 324:7	hplf 22:20,25	335:13
239:23 240:10	326:13 329:5	huh 21:22	hydraulics
241:5,18,22	330:6,13	53:19 55:4	162:1,25 163:2
243:15,20	331:11,22,25	87:10 90:2	165:8 183:8
247:10,20	332:16 335:11	115:10,14	244:3 245:20
248:6,9,17	336:23 337:2,6	144:14,25	hydrophobic
250:15,20	337:10 338:3	145:18 148:3	222:10
251:23 252:8	338:14 339:9	148:24 152:6	hypothetical
253:20 254:3	339:14,19,24	152:23 199:20	168:17,18
254:10,18,22	340:4,18	200:23 257:1	247:7,8 254:6
258:14,23	341:23 343:14	264:19 271:9	254:15
259:14,16,25	345:17 346:8	277:14 278:8	hypotheticals
262:7 263:6,11	347:3,7,10,19	283:1 292:7,20	255:2
263:24 264:6	348:1,4,8,10,16	293:21 297:8	i
264:12,17,19	348:22,25	315:12 318:9	
265:7,13,22	349:3,7,18,22	344:6	idea 102:15
266:4,12 267:6	351:2,8,16,24	humic 218:21	148:8,15
268:4 269:24	352:1,13	hunt 4:17	ideal 245:24
270:5,14	hose 275:24	14:10,12 31:7	identification
272:10 273:23	278:16 282:2	269:16 270:16	16:8 27:8

28:13 62:6 101:17 104:9 116:17 173:23 186:15 207:20 229:15 241:21 291:4 300:7 337:5 identified 140:15 256:10 256:21 282:25 294:10 297:23 298:15 307:21 identifies 256:4 298:9 identify 37:25 53:7 54:14,15 54:18 182:17 244:6 268:14 296:9 325:16 347:8 identifying 345:10 illinois 36:25 illness 233:13 illustration 297:5 image 106:8,21 107:2 108:7,25 109:11 118:16 119:9,16 135:14 145:6 148:18 149:13 149:22 150:15 150:20 153:7,9	153:10,18,20 281:8 images 104:11 149:25 imagine 122:24 167:15 221:16 248:12,14 287:5,10,18 301:13 316:24 316:25 immobile 86:1 86:7,13,14,15 87:7,9,11,12,13 87:17,24 88:6 impact 57:25 80:16 85:8 138:7 146:7 162:24 163:2 165:5 168:24 169:2 179:14 180:11 193:22 221:25 231:2 270:9 292:10 304:23 305:2 305:22 316:8 318:16 implementing 45:3 47:5 implicit 186:10 implicitly 229:4 231:16 implies 281:25 282:6	imply 168:6,8 implying 205:6 important 8:18 74:10 125:12 125:23 148:1 232:16 233:13 327:16 347:1 impressed 289:17,23 impression 165:25 173:2 231:22 232:10 317:3 inches 143:15 223:13,14 incidental 208:16 include 29:2 36:1 132:25 230:4 240:14 315:14 included 103:7 120:6 133:4,7 255:11 315:10 322:8 343:18 347:6 including 333:10 inclusive 32:18 incomplete 247:7 254:6,15 incorporate 241:9 253:6 323:5	incorporated 199:6 225:3,4 229:1 237:23 incorrect 321:19 increase 88:21 88:25 90:18 188:17 189:5 194:1 257:9 311:20,21 319:4 328:23 increased 7:25 90:11,13 250:2 276:23 increases 180:21 188:16 189:4 incur 135:14 independent 85:22,23 142:22 268:18 independently 239:10 indicate 93:24 135:25 251:9 257:14 299:18 301:15 indicated 257:14 indicates 201:12 261:11 261:18 333:11 333:25
---	---	--	---

indicating 53:5 135:9 149:6 236:9	inform 243:6 243:12,15 244:15,24 245:9,13 247:15	219:5 220:7,25 221:4 222:6,9	intended 282:1 315:23 347:7
indication 147:24 148:7 181:10 252:2 284:2 299:16 332:6 333:10	information 11:5 25:6 29:24 42:21 65:2 66:9 67:13 74:15 75:15,19,25 76:13,19,24 78:1 91:9 98:16,19 99:2 125:6,13,23,25 126:9 143:2 156:8 173:3,22 181:8 210:17 246:19 254:8 266:3 273:17 315:1 326:14 327:7	input 142:14 231:24 282:12 283:7	intentionally 70:6 306:20
indicative 257:18 258:2		inserted 278:18 304:20	inter 172:10
indirect 231:12		inside 79:16 82:12 175:25 195:7	interact 172:13
indirectly 56:4 56:15 229:1 234:4 235:19 240:21 253:6 255:13 264:2 264:20 321:22		insight 248:20	interaction 172:16 270:22
individual 120:3 132:25 133:3		inspected 72:24 73:2,12	interest 273:25 281:21
individual's 232:14,22		inspecting 72:13	interested 49:15 355:15
individuals 56:9,19 57:22 127:11		installed 119:24	interesting 309:4
induce 182:23		institute 36:1 39:8,10	interface 187:4 187:17
industrial 22:24 39:9 272:18		instructed 295:23	interfacial 88:11
industries 39:7		instructing 267:2 295:22 296:3	intermittent 172:10
industry 38:24 39:3,16 133:24	informed 250:25	instructions 279:11,18 280:11,25 281:4,22 282:24 285:7 294:4,11	internet 123:21
infinite 114:20 114:21	ingested 120:23		interpret 163:3
	inherent 312:3		interpretation 139:15 201:10 203:2,11 282:22 283:10
	initially 24:1		interpreted 162:21
	injected 64:6		interrupt 9:5 9:10
	injection 64:3 208:19		interviews 344:9
	inlet 97:15,21 246:1,11 247:3	insulation 82:13	introduce 245:21
	inorganic 217:1,14,15,20	intend 127:24 128:3	

<p>introduced 314:4,6 315:13</p> <p>introducing 246:15,25</p> <p>introduction 281:11</p> <p>inventory 297:23 298:15 299:1,12,12</p> <p>investigating 332:11</p> <p>involved 44:12 44:18,20 46:5 46:8,13,16,19 123:2 127:16 167:21 221:19</p> <p>involvement 127:3,15,20 130:11</p> <p>iowa 37:6</p> <p>issue 138:12 213:20 221:14</p> <p>issues 324:3</p> <p>issuing 173:13 310:22 311:1</p> <p>it'll 80:8</p> <p>items 226:13</p> <p>iteration 285:12</p>	<p>j.c. 266:19</p> <p>january 4:6 18:14 19:24 21:9 23:12,16 27:12 28:15 29:12,18 30:6 34:13 325:11 325:15 326:4 326:20 327:3</p> <p>jerry 14:19</p> <p>job 233:4,19 340:10</p> <p>johnson 272:21 273:3</p> <p>joined 6:9 12:3</p> <p>jones 26:6</p> <p>journey 50:10</p> <p>judge 273:11</p> <p>judgment 197:13 216:20 239:5 301:13 308:10</p> <p>july 248:18 256:5,10 257:3 258:8 260:2 338:1,13,20 341:21 342:12 342:15</p> <p>jump 269:20,25</p> <p>jumped 292:17</p> <p>june 22:7,10,15 22:19 296:23 297:7</p>	<p>jurat 3:9</p> <p>justice 4:18 300:9</p> <p>justified 131:16 142:19 143:5</p>	<p>knezovich 302:14,18,25</p> <p>know 8:13 10:2 14:3,8 16:18 19:10,19 21:21 24:17 32:4,19 34:6 41:4 46:19 49:2,21 64:5,13 68:4 75:22 76:25 77:2 83:21,23 84:1,2,5 85:20 90:24 102:24 103:17 105:9 109:2,6,8 116:8 119:8,17 121:4 143:19 143:22 146:1 146:13 148:9 148:17 150:6 151:13,20 153:25 161:20 173:8 175:12 176:23,25 178:13 179:7 181:3,11,14,16 182:2 183:3 184:2 194:16 196:19,22 197:6 207:2 209:10,16 210:6,23 211:4 211:5,10 212:11 213:14</p>
j		k	
<p>j 2:3 188:17 189:5 266:19 353:1</p>		<p>kailey 2:15</p> <p>kc 2:9</p> <p>keep 27:4 58:5 146:25 225:10 227:13,19 259:15 291:11 321:1</p> <p>keeps 90:19</p> <p>keller 2:17</p> <p>kevin 12:4</p> <p>key 118:5</p> <p>keyed 118:13</p> <p>kind 13:11,18 64:16 70:24 84:7 153:25 154:7 167:12 167:20 177:4 218:20 233:17 245:1,2 344:16</p> <p>kinetic 110:14 113:5 330:2</p> <p>kinetics 110:17 122:7 221:19</p> <p>kitchen 313:13</p> <p>knew 64:11 270:21,21</p>	

<p>213:15,22 216:18 217:9 218:20 220:15 223:3,6 226:9 226:14 230:20 231:2,18 232:2 232:5 233:11 234:13 237:13 244:11 248:3 253:12,19 256:11 258:6 258:18,22 259:16,17 265:22 270:24 271:1,8,10 273:16 296:16 300:23 312:15 314:20 316:22 323:14 326:9 326:11 332:3,5 339:20 343:12 344:12 345:18 345:20,24 346:2,9 348:8 348:20 350:21</p> <p>knowing 102:23</p> <p>knowledge 17:11 18:5 19:13,21 29:4 46:14,21 68:6 76:11 116:15 147:21 207:9 207:12 214:1</p>	<p>214:11 215:3 216:21 244:13 273:8 295:20 314:24 326:18 332:4,9</p> <p>known 173:5</p> <p>konikow 25:25 26:3 319:25</p> <p>konikow's 319:23</p> <p>kyle 4:19 300:10</p> <p style="text-align: center;">I</p> <p>I 1:22 2:8 3:1 3:13 4:16 5:1,7 15:16 354:3 355:4,19</p> <p>lab 340:11</p> <p>laboratories 155:16</p> <p>laboratory 43:25 44:16 201:13</p> <p>lack 68:13,19 69:12,17,24 214:11 215:3 241:8 320:10 343:4</p> <p>laid 169:24 170:16</p> <p>lake 88:13 171:17 172:9 180:19,24</p>	<p>189:22 192:17 197:12 201:12 201:24 203:14 204:2 205:1,5 218:1,2 289:25 317:1,5</p> <p>lakes 202:9 203:5 205:2</p> <p>laminar 194:11 195:1,2 196:24 197:4 276:17</p> <p>lana 1:22 5:7 354:3 355:4,19</p> <p>land 7:24 23:1</p> <p>language 146:11 162:13</p> <p>large 44:14 196:6,7 201:13 202:15 212:2</p> <p>larger 114:22 114:24 249:21 308:2 310:7 316:10,16 317:6,9,16</p> <p>largest 198:20</p> <p>late 25:9</p> <p>laura 2:3 6:6 77:23 126:2 175:9 259:14 264:6 349:4</p> <p>law 79:4 121:25 122:3,5 122:10 329:21</p>	<p>lawful 6:18</p> <p>lawsuit 14:4</p> <p>lawyer 26:18 105:20,22</p> <p>lawyers 26:12 26:17</p> <p>lbaughman 2:6</p> <p>lead 276:24 318:5</p> <p>leadership 36:13 50:9 352:11</p> <p>leading 192:13</p> <p>leads 158:25 194:25 228:3 317:20</p> <p>learn 98:6</p> <p>leave 79:19 146:8 253:21 266:7 329:2,18</p> <p>leaves 56:18 120:23</p> <p>leaving 293:3</p> <p>lecture 39:19</p> <p>led 134:6,15 198:7</p> <p>ledford 1:22 5:7 354:3 355:4,19</p> <p>left 79:25 121:14,19 157:12 324:8</p> <p>legal 15:5,12,17 268:13 324:24</p>
--	--	---	---

lejeune 1:3 4:18 14:6 39:17,22 46:6 46:10,13,17,20 48:11 51:3,11 51:18 52:2,10 56:19 57:22 60:5 66:8 67:14,20 68:5 72:10,19,22,25 74:2,8,11,18,21 75:4,12 76:10 76:14,20 90:25 91:5,20,24 92:5 93:17,21 94:3 96:8 100:8 116:9 120:17 125:4 125:15 126:10 126:23 127:6 128:19 156:8 171:17 172:19 172:25 173:9 173:15 178:19 179:7,12 181:4 182:3 204:15 205:9,24 206:5 206:18 207:13 209:20 210:3 211:12 216:12 216:15 218:8 228:16,23 248:3 259:3 271:24 291:22	292:25 297:23 299:2,8 300:9 304:7 327:5 343:17 344:15 354:2 length 212:8 lesser 55:13 81:2,2 97:20 98:2 192:16 letter 118:1 155:17 level 68:24 69:9 69:10 70:9,25 71:3,7,20,24 99:2 140:8 148:7 158:3,4 172:3,4 176:2 176:21 178:1 179:19 222:9 236:9 237:1,14 237:18 238:3,9 238:18 239:7 239:11,16 240:12,18 242:5 246:22 247:12 255:11 261:20 340:25 levels 7:25 56:8 57:21 68:15,21 69:2 70:13 71:16 81:5 99:6 115:22 181:4 209:20 210:3 211:12	218:3 246:21 259:4 library 268:19 licenses 43:1 licensing 42:2 licensure 42:25 43:1 lid 112:3,17 light 230:12 237:14 likelihood 350:24 likely 63:13 73:7 94:20 209:1,14 288:12 289:25 292:11 293:17 299:22 334:18 lime 102:7 limitations 90:21 limited 85:8 96:25 97:2,8 104:25 105:13 110:19 195:17 195:22,24,25 215:18 218:12 limiting 145:3 lincoln 48:25 49:1,11,12,16 50:8,9,11 274:1,11,13 lincoln's 50:9 274:15	line 4:21 19:24 208:5 284:17 284:19,21 291:18 292:22 315:13 lines 141:21 208:9 300:17 lip 304:16 liquid 116:4 208:22 list 28:17,25 29:8,11,14 30:1,5,24 31:4 32:11,18,24 33:7,11,22 34:2,3 53:1,3,5 53:15 64:22 117:2 154:25 156:1 267:21 267:21 270:20 271:4,5,17,17 289:6 324:19 324:22 346:13 348:17 349:17 listed 30:13,24 31:9 32:2 34:8 37:19 53:9,12 118:6 132:10 178:16 219:11 219:14 listened 305:16 lists 32:17 liter 342:17,18
--	---	---	--

literature 190:19,23 191:1 199:9,24 199:25 200:3 330:23 343:19	308:14,24 309:14 longer 58:7 79:1 146:18 150:6 184:16 184:18 227:17 301:12 334:4	258:13,15 270:19 271:3 279:15 287:14 291:3 296:18 296:19 297:19 297:20 303:25 304:11 313:7 313:11 325:5 330:4,22 331:8 335:25 336:1 346:6 347:6	looks 28:1,1 108:24 109:3 117:7,7 242:16 278:5 335:17 lori 24:2 lose 122:11 loss 83:8,16 84:11 85:1,17 129:3,16,24 130:8 134:7 137:4,19 139:14 141:2 158:14 205:23 206:4 207:1 303:12 318:22 334:12
litigation 1:4 4:18 274:16 275:4,7 300:9 354:2	longley 4:19 275:13 300:10 300:23 301:7 348:14,20,21 349:10	looked 17:6 31:6 55:13 99:13,20 102:20 120:1 213:22 220:18 220:19 313:12 313:13,15 321:10 342:3 344:20	losses 10:22 56:4,15 60:1,4 60:9,11,17,21 60:24 61:1,3,5 61:11 64:9 85:25 86:6,12 87:7,16 88:5 89:10,15,22 90:7 93:21 94:2,23 95:4 120:24 121:13 121:18 128:14 130:18,20 131:4,5,14,23 131:25 132:4 132:21,24 134:24 135:1 135:14,18,20
little 58:6 78:25 79:1 85:8 97:12 118:4 146:18 183:6 224:8 227:16	longley's 348:11,24 350:7	looking 18:19 31:4 55:14,17 99:24 117:12 120:2,3,6 128:12 140:14 145:4,11 152:4 154:3 164:3,8 199:18,21 211:22 213:5 214:21 230:5 238:16 253:12 259:25 260:20 321:9 343:25	
lived 56:19 57:22	look 27:22 32:14 33:8 42:15,17,20 43:10,12,19 44:24 45:20,21 52:21 53:3,11 53:15 56:1 99:22 100:9 102:1,2 103:8 104:14 109:11 112:17 120:10 120:11 152:4,5 152:21 156:24 174:4 188:20 190:14 199:12 203:20 214:3 214:19 215:21 223:5 234:22 236:23 256:4		
in 354:4			
load 295:22 296:3			
loading 280:7 280:14,18 282:13 283:2,8 285:7 294:3			
local 97:8			
localized 97:6 97:15			
located 272:16 284:15			
location 272:18			
long 7:17 11:16 25:13 27:13 50:7 82:5 213:21,23 214:4,19			

135:22 136:1,6 136:14,19,25 137:9,9,10,21 137:23 139:7 139:12,16,18 139:23,25 140:9,16 141:10 142:1 142:14 159:17 173:19 202:9 203:5 209:18 210:1 215:5,7 215:9 226:18 226:25 228:15 228:22 230:2 230:15,21,25 231:19 234:4 235:13,22 239:17 240:2,7 240:11,19 243:6,12,16 244:15,24 245:6,9,14 247:16 249:1 250:22 251:1,3 251:6,8,11,16 251:17,22 252:1,2 253:2 255:13 257:7 257:11,14,15 257:18 258:2,5 262:19 264:3 264:21 265:6 266:13 276:25	311:10 314:21 315:14,16 321:23 343:6 343:10,21 348:2 lost 82:11,17 94:17 134:20 135:11 145:14 206:16,22 lot 50:14 56:11 108:10 306:13 lots 83:19 255:1 low 196:10 201:19 202:23 206:11 218:2 lower 67:25 169:13 200:10 218:4 226:17 226:25 250:7 250:14,17 276:6,9 319:7 lowest 133:7,13 191:1 198:3,8 198:21 203:13 203:22,25 lozenge 177:1 lunch 146:17 154:12,19 155:24 157:4 luxenberg 2:4	m m 4:1 7:6 277:8 277:16,19,19 277:24 278:2 279:1,17,23 280:4,11,21 285:6,12,12 286:12 288:10 294:4,11,18,20 295:5,7 297:25 m1 296:9 m106 278:17 279:11 m107 117:8,11 118:1,19 285:19,24 290:19 293:24 297:24 298:1,1 298:10,10,21 m107a1 117:18 m107a2 117:18 m107a2c 117:18 m107s 299:8 m129 298:4 m149 296:16 296:22,22 297:15,24 298:1,16,21 299:1,8,17,18 made 67:12 134:6 143:19 143:25 144:4,7	147:8,9,12 197:14 220:8 230:3,14,24 309:18 328:24 magnitude 61:1 67:23 180:6 magnitudes 191:12 main 63:23 198:10 273:24 maintain 109:23 112:22 majority 155:1 make 9:2,16 16:24 27:20,25 28:9 63:11 75:11 78:23 129:24 150:9 152:10 160:19 169:12 180:7 180:11 193:6 193:12 221:10 254:9 269:4 302:17,24 327:8 331:9 makes 156:22 167:25 212:24 213:1,8,13 making 130:7 141:24 198:13 221:11 332:12 man 14:10,12 14:15,19,23
---	---	---	--

25:23 93:14 management 20:12 21:15 24:18 manhole 118:17 119:4,5 119:11 281:10 285:8,17,18 286:6,12,20 287:6,11,13,15 288:13 289:9 289:15 290:5,8 290:21 292:12 293:17 294:6 294:14 296:5 300:2 301:10 303:23 304:2 304:16,23 305:9 310:21 312:10,12,17 313:2,21 314:9 315:7 317:20 318:5,8 manholes 116:15 286:13 manner 111:3 manual 4:10 275:5,8 287:8 296:8 297:7 manuals 281:23 288:23 290:12 295:22 296:3	map 39:20 march 256:14 291:7 292:25 293:12 marine 285:7 marines 51:6 288:6 289:14 300:18 301:16 mark 14:15 31:7 101:19 104:6 105:23 marked 4:21 16:8 27:8 28:13 62:6 89:6 101:17 104:9 105:3 116:17 158:11 173:23 186:15 207:20 229:15 241:21 255:18 291:4 300:7 337:5 338:6 marking 16:9 27:9 28:14 62:7 116:18 173:24 186:13 207:16 229:13 241:18 291:5 300:8 maslia 2:16 4:16 23:7 24:14,15 25:2 25:4,15,17 55:6,7,8	124:14,19,20 229:21 236:6 238:9 239:6 241:20 261:7 263:11 320:21 maslia's 229:5 229:8,14 236:15 238:22 243:1 255:18 258:24 260:1 261:14,22,23 262:23 263:22 265:12 266:3 321:9,10 337:17 mass 22:16 89:3 187:16 188:13,16 189:2,4 194:1 277:3 master's 37:3 material 166:19 215:23 215:25 216:6,8 216:23 217:6 217:10,14,15 218:7,15,16,25 219:8,10,18,20 220:17 221:4,8 222:1,3 224:10 224:14 268:15 materials 28:17 28:25 29:3,11 29:20 30:3,4	30:11,11,13,23 32:2,10,16,17 32:23 33:6,11 33:21 34:3 52:25 117:1 120:11 142:6 154:25 155:3,3 155:7 217:20 219:13 220:7 220:10,25 222:9 268:20 324:16,19,22 325:1 346:12 348:17 mathematically 132:14 matrix 221:22 matter 8:14 14:25 31:16 52:16 179:22 218:2,5,21 219:6,6 221:20 288:6 matters 219:9 mattingly 62:17,18,19,22 63:4,8,14,19,22 64:1 66:3 67:13,19 68:1 68:4,8 213:6 maximum 163:1 178:3 mcb 125:4
--	--	--	---

mckone 10:23 11:1 302:14,17 302:24 303:4 312:7 mean 10:16 19:15,21 29:5 31:12,18 37:12 39:6 40:9 48:23 49:4 60:24 67:2,6 69:6 85:6 88:2 88:13,23 93:13 94:13 95:2 96:11 97:9 114:22 116:14 123:12 127:12 127:21 133:11 136:25 137:15 139:9 151:11 152:3,24 153:6 163:18 167:2 169:16 183:11 183:19 184:3 187:14 191:24 191:24 197:13 205:9 210:24 216:5 226:3 230:23 231:23 232:20 234:9 237:5 239:1 241:5 243:22 246:7 249:20 254:1 263:7 265:14 267:16	270:6 274:2,8 274:9 279:8 306:6,18 313:16,24 314:15 329:6 334:20,23 339:19 348:5 350:12 meaning 99:15 194:9 215:22 247:11 290:18 303:24 meaningful 327:10 means 167:12 187:11 234:24 239:16,25 240:1,13,18 282:19 meant 77:3 139:10 172:8 230:21 231:11 289:4 338:15 measure 147:3 147:12,14,19 151:21,25 152:15 158:1 244:20 245:6 245:22 323:8 measured 146:14 147:15 151:18 157:20 322:25	measurement 143:20 144:1 147:9,10,16,22 147:23 148:11 148:14 152:17 246:3 250:7 322:11 measurements 76:10 107:18 232:11 322:15 measures 150:9 measuring 147:20 148:5,5 153:1 157:14 246:2 mechanical 96:3,8 167:21 167:22 mechanism 154:7,9 media 223:12 223:13 medical 129:13 medium 223:4 223:16,19 meet 11:11,16 24:15 63:14 meeting 63:8 130:21 139:11 meetings 124:17,22 members 51:6 269:11	memorandum 3:15 memory 12:16 46:15 52:14 65:12 66:10 73:20 170:21 347:8 memphis 37:4 mention 39:19 39:21,23 290:4 296:4 mentioned 31:2 43:17,22 44:7 45:8 50:22 55:17 98:10,11 180:5 185:22 219:9 220:13 221:21 275:22 305:7 325:20 346:16 mertz 24:2 message 14:18 met 11:13,18 25:2 26:4 63:4 275:13 metal 152:18 meters 302:19 302:20 303:1,2 303:5 method 79:6 141:18 180:19 181:1,21 182:14 186:10 199:22 207:25
---	--	--	---

329:20,25 methodology 59:15 142:13 323:8 micrograms 249:11,14 250:6 251:23 251:24 252:13 252:20 257:4,5 257:23 260:4 342:17,18 mid 25:9 middle 152:12 152:18 262:16 293:23 295:2 297:13 mike 14:23 military 43:4 46:23,25 47:10 47:12 48:19 49:14,19,25 73:7,22 269:11 274:25 million 195:15 195:20 196:9 196:10 212:5 mincing 262:4 mind 95:5 149:15 150:5 185:11 284:1 301:23 mineral 222:14 222:16,23 224:9 225:3,3	225:4 minerals 222:20 224:25 225:9,17 minimal 177:15 224:4 343:4,5 minimize 206:12 minor 35:16 94:15,21,25 95:4 97:6 128:13,21 129:2,16,25 130:4,8,13,14 130:21 131:1,7 131:15,17 134:23 135:18 135:20 136:2 136:12,14,16 136:19,25 137:9 139:12 140:9 191:25 208:16 216:21 217:16 219:6 219:19 220:23 221:5 224:15 249:1 257:7,10 257:18 258:2 343:7,10 minute 101:24 301:24 minutes 146:23 146:24 154:24 299:23 300:20	301:8 324:10 327:20 misheard 298:13 missed 256:23 missing 55:6 misunder 298:13 misunderstand 178:20 mix 89:22 90:10 93:18 96:9,12,22 97:4,7,14,24 167:10 mixed 83:7,15 84:11,23 85:2 85:16 121:18 121:20 166:16 167:1,3,4,11,11 167:14,18,20 182:15 324:20 mixes 88:20 93:1,5,10,12,15 96:2 mixing 84:7,15 84:18 85:7,23 86:2,8,16 87:8 87:18,25 88:7 88:24 89:11,16 90:3,4,19 93:14 96:4,8 97:5,6,13 166:9 167:8,10	167:13,17 182:8,9 208:20 mobile 87:11 mode 114:5 191:19 224:8 model 56:4,7 56:15,17,23 57:4,18,20 228:14,21 230:22 231:3,9 231:9 232:6 234:7,8,9,14 235:23 237:5 237:11,12 239:16 240:1 240:18 241:3,8 242:23 252:14 252:19 253:6 260:12,14 261:13 262:6 263:10,19 264:1,20 265:5 265:21,24 277:8 281:11 315:2 319:10 319:14 320:1,8 320:16,17 321:12,20,21 330:2 modeling 52:1 52:5,10,25 57:12,15 125:6 125:13,25 126:9,22 127:5
---	---	--	---

128:1,4 models 119:23 242:10 320:18 molecular 84:25 molecules 187:9,21 215:23,24 216:6,7 moment 180:14 236:23 343:12 344:3 monthly 24:1 41:9 209:20 210:3 211:11 months 155:5 morning 6:11 6:12,24 11:19 166:9 morris 2:16 4:16 23:7 24:14,15 25:2 25:4,15,17 241:20 motion 104:24 105:5,6,18,19 motley 2:14 move 96:16 105:4,24 111:5 111:7 moved 227:23 281:9 movement 180:20 191:25	315:4 moves 92:4 multiple 25:12 mustafa 25:23 n n 2:1 3:1,1,13 4:1,1 5:1 7:6 15:16 354:1 nac 35:7 nakasone 10:21 11:1 141:24 name 6:25 15:14 61:24 62:3 131:3 231:25 277:19 329:12 354:2 named 14:10 14:12,15,19,23 25:23 nap 164:20 nappe 149:1 159:24 160:21 160:25 161:11 162:2,4,15,18 164:11,17 168:5,8,8,12,14 169:3,15 narrowed 344:21 nationally 44:14 natural 71:1,18 71:24 72:6	218:1 naturally 71:19 115:23 nature 116:16 120:4 183:6,10 194:23,24 195:5 219:8,17 219:19 313:19 323:24 351:19 naval 43:9 near 283:18,19 305:9 nearly 159:17 necessarily 97:14 137:1,8 192:12 necessary 306:10 329:20 need 6:13 20:15 55:25 58:4,10 74:22,24 75:1 75:2,3,14 83:21,23 84:1 84:2,4 109:5,5 109:7 153:10 176:25 177:7 192:25 193:2 218:20 234:1 268:21 348:8 needed 74:16 75:15 76:24 261:3 277:10 327:8 345:11	neg 137:7 negligible 94:9 94:14,16 130:19,20,22 131:6 137:2,4 137:8,10,12,13 137:16,17,19 137:21,23,24 138:1,6 139:13 140:1,6,7,9 218:13 219:18 220:23 221:5 230:3,17,21,25 231:11,20 249:1 251:22 252:1 343:5 never 72:24 78:14 114:16 157:20,24 173:5 174:14 195:7 275:1 282:1 349:9 new 2:5,5,11 155:19,25 156:5 157:16 192:7 314:5,6 325:10,16 326:7,20 346:13 nice 75:18 335:17 nine 141:21 nineteen 342:15
--	---	---	--

<p>nodding 8:20 nods 113:9 123:14 126:3 151:8 166:11 231:1 non 160:4 170:6 323:3 nonsteady 247:22 normal 104:4 177:12 normally 352:12 norman 7:7 62:20,21 63:3 65:11 211:20 211:23 212:3 215:15 north 1:1 2:11 355:12 notary 353:16 353:20 note 105:2 295:3 noted 158:19 353:11 notes 4:7 62:14 62:15,16 63:7 63:10 64:25 66:17,21 98:23 100:10 213:5 291:3 notice 5:9 160:5,11</p>	<p>nova 157:6 november 252:13,15,19 nozzles 306:19 nuances 86:19 87:1,2,22 number 15:25 16:14 20:13 30:24 36:19 50:23 66:16 101:20 102:4 104:7 107:4,4 116:22 118:14 118:16 124:4 125:5 133:7 143:17 181:14 181:16 199:23 208:4 212:22 215:18 220:19 244:1 272:8 287:17 288:22 290:17 292:1 307:12 325:6 325:10 326:10 330:16 337:18 337:22 340:13 343:2 346:18 350:16,17 353:22 number's 159:13 numbers 103:6 103:6 124:1,2 124:11 132:7</p>	<p>132:10,16 139:21 158:18 158:19,20,20 158:23 159:1,3 211:3 249:20 252:11 259:24</p> <hr/> <p style="text-align: center;">o</p> <hr/> <p>o 3:1,1 4:1 5:1 7:6 354:1,1 o'leary 2:10 6:10 105:13,16 177:2 336:19 336:21 oath 6:14 95:17 95:18 157:10 353:6 object 13:2,10 20:11 33:18 34:4,15 50:2 51:14,20 52:17 53:25 56:10 68:16,22 69:4 69:15,19 70:3 70:20 72:1 74:3,14 75:6 75:21 76:15,21 77:19 80:10,12 80:18 81:15 82:7,22 83:3 83:10,17 84:13 84:19 85:3,19 86:3,9,17,20 87:19 88:1,17</p>	<p>88:22 89:17,24 90:14 91:1,6 92:6,17 93:3,7 93:11,23 94:4 94:7,12,19,24 96:10,18,24 97:10,19 98:1 98:9,14,21 99:9 100:7 101:1,14 103:11 104:18 113:3,11,23 114:3,18 115:6 115:25 116:12 118:21 119:25 120:8 132:11 140:3 170:5,6 170:19 175:6 210:24,25 211:7,7 215:10 217:12 222:18 222:25 243:13 243:17 247:6 247:17 248:5 248:11 251:19 253:4,15,23,24 266:25 268:2 269:22 270:2 270:12 273:14 299:10 301:18 304:8 305:24 308:3 310:1,12 311:14 313:23 314:11,22</p>
---	---	---	--

318:25 319:17	137:6 139:4	235:24 237:8	observations
320:2,10,24	140:19 141:11	237:20 238:4	200:16
321:24 323:11	142:25 143:21	238:13,25	observed
343:14 346:5	144:2 147:6	239:19 240:4	183:15 236:7
348:3	149:14 150:3	240:23 250:10	242:3,5 255:23
objection 13:23	151:14 153:21	250:18 252:6	260:17 290:19
15:23 18:23	160:3,9,16,22	254:14,15	290:20 292:8
19:7,14 29:21	162:9 163:6	258:10,20	305:8,11
30:7,17 31:17	164:18 165:13	259:19 262:2	observing
33:1,12,15	169:8,18	263:2,8,20	73:21
36:15 41:1,1	174:25 177:11	264:5 265:2,3	obtaining
52:17 56:20	180:18 181:6	265:9,16 266:1	125:6,24
57:5,24 60:7	182:12 188:2,9	269:22 272:4	obviously
60:14,20 61:7	189:17 191:17	278:23 287:22	164:5 204:17
61:14 78:16	191:22 192:9	289:16 290:10	233:3
88:9 91:25	192:15 193:17	294:7 307:3	occasion 81:17
102:13,21	194:5 195:23	309:2,16	occur 113:8,10
104:12 106:9	196:12 201:8	322:17 326:13	121:13,19
107:10,20	202:13 203:9	329:5 331:22	139:2 177:9
108:8,19 109:4	203:18 204:4	331:25 332:16	186:11 216:11
109:14,24	205:25 209:8	332:21 335:11	216:14
110:24 112:15	209:21 210:4	338:3,14 339:9	occurred
119:12 121:1	210:11,20	339:14,16,18	128:14 138:21
121:22 122:13	211:13,14	340:4,18	208:18 251:1
122:18 125:16	213:24 216:16	341:23 347:25	312:9
126:11,11,17	218:10,17	351:2,8,16	october 241:20
126:25 127:13	219:2 220:5	objections	279:11 286:4
129:5,19 130:1	221:6 223:24	105:13 107:15	293:4,12
130:15 131:10	224:22 225:18	108:14 227:2	offer 74:11
131:12 132:18	226:20 227:8	254:5,20	127:24 128:3
133:2,22	228:17,24	obligated 8:15	228:1
134:10,22	231:4,14,21	observation	offered 28:8
135:5,16,24	232:8,17,24	144:8 166:1,5	58:20 59:7
136:13,22	233:15,22		75:4 205:16

237:24	40:7,16 43:17	175:22,24	296:12,14
offering 51:9	44:7 50:22	176:8 182:21	297:6,11,22
51:16 56:6,16	53:20,25 54:7	186:24,25	298:8,13 304:5
57:18 142:22	54:20,24 56:2	189:1,7 190:10	307:6 324:4,14
237:17 238:1,2	58:8,17 73:19	193:7 194:8,10	324:21,25
239:14 240:10	79:2 85:15	196:8 197:6	325:4,8,14,22
240:16,20	87:13 91:15	200:6,10,13	326:9,17,25
246:4 270:10	95:24 96:7	201:1 205:14	327:19,25
offers 229:22	101:11 106:2,4	208:14 213:11	328:24 329:18
office 7:8,11,12	106:6 109:18	214:17 221:3	330:4,9,12
355:16	112:4,12	223:21 225:12	331:3,10,15,19
official 40:10	113:17 114:11	227:18 228:8	331:23 332:10
offline 163:23	117:19,22	229:16,20	332:20 333:4,8
oh 11:6 42:12	118:4,19	230:1,8,9,11	333:15 334:20
43:7 58:22	124:13 125:2	233:9 234:25	335:1,15,21,24
65:6,10 91:3	126:4 127:24	235:21 236:20	336:4,7 337:4
98:22 112:4	128:6 133:16	241:11 244:11	337:15,21,24
117:14 123:18	133:19 138:6	246:7 249:5,10	338:5,10 339:4
127:24 144:21	138:16 139:21	253:11 256:9	339:6,10 340:1
145:6 154:4	140:13,22	257:3 259:1	340:1,9,12
161:5 170:8	145:10,12	261:17 263:16	341:3,7,8,14
200:24 233:9	146:16 147:1,2	266:4,9,11	342:2,6,9,19,24
236:20 306:16	148:20,21	267:5,20 273:6	343:8 344:2,4
337:10	149:21 151:2	274:7 277:24	344:12,25
okay 13:17	154:14,22	278:11 279:16	345:5,13,14
16:15,16,17,19	156:15 157:1	279:19,21	347:2 349:5,8
17:24,25 18:9	157:12,20	280:14 281:3,8	349:16 350:5,7
18:14 19:18,23	158:1 159:15	281:15,20	350:10,13,20
20:18 21:2,7	159:22 161:6	282:6 283:4	351:22 352:12
21:12 22:3	161:15 164:2	285:3,6,11	oklahoma 1:14
24:17,25 25:1	164:15 166:6	288:19 289:6	1:14 5:7,7,9
26:15,23 27:1	168:14 169:22	290:17 291:11	7:7,13 38:8
27:6,7 32:12	170:22 171:13	291:18 292:23	41:7 44:6 45:6
34:9,12,17	174:8,17	293:9 295:2	47:11 65:23

<p>211:20,23 212:3 215:15 353:2,16,20 355:2,3,6,13,13 355:20 once 7:15 8:12 9:14 116:3 187:11 246:25 248:1 255:10 one's 108:10 ones 31:22 52:13,15,21 54:3 55:12,14 65:13 155:9 online 149:2 161:12 162:16 162:23 164:16 165:7 onward 29:13 open 13:11 59:11 66:24 171:16,20 172:8,9,11,14 172:25 173:6 188:19 198:4 204:15 206:9 207:3 253:17 253:25 266:21 278:21 279:3 opened 111:15 111:20 180:20 opening 287:13 openings 306:21</p>	<p>operated 62:21 208:24 209:13 213:21,23 214:5 operating 66:6 148:15 211:17 212:12,16 215:17 246:9 248:15 323:3 327:14 331:24 332:14 334:4 operation 63:24 64:2 66:12 177:13 213:10 214:15 214:20 215:2 279:22 280:3 327:15 operations 304:7 operator's 4:10 operators 333:2 opine 128:13 opinion 56:3,14 56:22 57:1,3 57:11,14,17 78:20 81:24 87:15 88:8 89:13,22 97:17 119:21 127:4 127:25 128:3 128:12 134:5 134:12,14</p>	<p>136:18 140:23 141:2,9,25 155:8 162:4 164:15 165:22 166:3 171:23 179:23 180:3 180:11 193:8 203:12,22,25 205:16,21 213:1,12 215:20 218:6 221:5 226:25 227:21,23 228:3,4,10,12 231:7,13 234:3 235:17,21 236:4 237:17 237:19,22,24 238:2,6,11 239:14,20,21 239:24 240:6,7 240:8,8,11,16 240:21,24 241:1,3 246:4 250:22 252:25 253:5,8 257:6 257:16 258:1 262:14 264:10 264:11,14,18 264:21,23 266:6 272:14 273:6 292:10 302:19 303:1 304:6 309:22</p>	<p>310:22 319:15 337:18,22 340:14 343:2,9 350:16,17 351:3 opinions 28:8 51:9,17 56:6 56:16 57:2,19 58:20,24 59:2 59:8,9,16,20,23 74:12 75:4 76:18 77:8,12 119:22 155:8 156:9 179:14 181:17 266:5 267:10,11,19 267:24 268:11 269:12 270:1 270:10 305:23 328:8 342:25 343:13 344:13 351:15 opportunity 9:15 75:18 206:12 opposed 32:24 159:16 167:10 169:24 170:17 279:6 opposite 227:7 optional 295:7 295:13,18 options 190:2</p>
--	---	---	--

<p>oral 42:7 301:4 order 20:12 21:15 24:18 67:22 74:11 166:20 267:3 352:8 ordering 352:9 orders 191:12 organic 216:23 217:5,10 218:1 218:5,7,15,21 218:25 219:8 219:10,13,18 219:19,22 220:16 221:8 222:1,3 organically 96:9,12 organizations 36:20 orifices 306:22 original 236:19 266:23 271:6 originally 29:12 outline 273:20 outlined 171:15 288:23 outside 78:18 79:15,17 81:9 82:13,21 83:2 83:7,14 85:12 176:2 207:12 232:25 233:16</p>	<p>233:23 237:9 259:20 268:17 268:24 303:22 overall 120:3 133:1 138:2,8 169:12 193:12 overestimation 134:7,15 overhead 280:15 281:12 282:13 283:5,8 283:11,15,24 284:4,23 289:3 overlap 156:11 overstated 203:15 204:3 205:17 own 32:10 33:10 158:23 267:20 oxygen 189:12 190:10,19 197:20 198:2,8 199:8 203:13 204:1 330:19 330:23</p>	<p>302:2,3,3,5 347:15,16,16 347:18 352:6 352:15 pace 8:24,25 9:1 page 3:2,14 4:2 4:21 16:25 19:22 22:4,6 23:2,3 24:13 27:17,23 29:12 29:13 30:4,13 30:20,21,22,23 31:9 32:2 35:4 50:22,25 53:10 53:11 54:7,21 55:5,6 59:12 89:4 92:11 100:11 101:24 102:3 103:1 107:3,5 108:3 108:4 117:13 117:22,25 118:5 124:24 128:7,13 131:19 132:3 132:23 134:18 138:17 140:11 140:23 141:20 144:12,23 150:24,25 151:1 152:7,21 154:5 155:2 158:12 159:21</p>	<p>161:4,5 166:6 168:2 170:23 171:13 189:8 199:22 200:25 204:12 208:3,4 215:20 227:21 228:12,18 229:17,21 230:5,7 235:3 235:4 236:1 238:17 241:23 242:17 248:17 250:16 255:8 255:19 260:1,7 261:10 262:14 262:16 271:19 277:11,12 279:10,13 281:8,15 282:10,18 285:11,22 286:15 288:8 291:8,23 292:14,18 293:2,19,23 294:17,23 296:7,10,11,21 297:1,3,4,13 298:18 300:12 302:7 303:20 306:2 307:8 310:21 315:11 325:1,6,6 326:12,12</p>
	p		
	<p>p 2:1,1 3:13 5:1 p.m. 154:18,19 154:19,21 185:17,18,18 185:20 241:14 241:15,15,17</p>		

330:6,13,14 331:11,13 332:23 333:16 333:17 334:7 336:8 337:13 337:24 338:8 338:19 339:12 340:12 342:6 343:16 344:4 pages 29:19 30:1,11 34:14 156:12 291:15 297:22 paired 345:19 346:4 348:5 350:15 351:14 pairs 342:20 345:24 panel 55:7,8 130:21 131:4 140:8 207:11 207:25 232:1 343:23 344:24 344:24,25 panels 230:14 paper 10:21,23 37:19 38:2 222:8 papers 38:1 paragraph 59:14 100:18 125:2 126:2 138:19 141:20 141:21 166:12	170:25 171:14 174:9,18,20,21 174:24 175:2 187:1 200:15 201:11 204:13 208:4 230:10 242:2 255:10 260:10 261:11 271:20 281:21 285:11 297:14 298:20 300:18 337:16,25 340:13 343:16 parameters 89:19 193:1,2 237:5,14,23 parse 86:19 part 37:23,24 47:2 48:4 71:13 73:9 81:3,3,4 163:18,18 167:24 181:20 183:21 184:5 199:2,2 207:10 207:10 211:25 213:4 214:2,18 223:3,16,19 228:2 233:25 236:14,25 237:10,11 238:21 260:24 260:25 261:15 262:5 263:9	269:11,12 271:22 284:5 298:9 319:20 322:10 343:18 344:11 347:1 pertain 14:23 particular 173:4 193:3 parties 5:3 partitioning 208:21 partner 36:6 parts 102:1,1 156:22 272:2 272:20,25 party 355:14 pass 324:7 345:14 351:23 passed 41:13 past 333:1 pat 15:16 patience 225:13 pattern 308:2 309:19 310:7 pause 159:6,9 274:23,23,23 323:23 pce 61:18 141:3 257:9,23 259:17 pe 1:10 2:16,17 4:5,6,16 5:5 6:17 27:11	41:20,21 42:23 353:5,13,17 354:2 355:7 peer 55:7,7 pending 14:4 58:14 104:23 105:18 people 9:22 25:12 81:11 319:20 peoples 120:19 percent 129:3 129:15,24 130:8,12,20 131:5,5,23,25 132:20,23 133:16 137:16 137:19 190:13 204:8 208:17 209:7 233:21 249:18,21 250:3,17,23 251:21 303:9 317:21 318:5 percentage 141:2 206:16 206:22 212:20 213:1,12,13 254:23 255:4 258:6,19 345:18 perched 152:17 perfectly 112:5
---	---	---	---

<p>performing 200:17</p> <p>period 49:20 50:4 248:15</p> <p>permanent 119:18</p> <p>permeating 215:24 216:7</p> <p>person 12:2 14:9,14,17,21 17:21 25:2 31:18,20,23 42:7 63:15 73:6 194:6 207:10 259:4 304:1 306:25 307:2</p> <p>personal 14:13 268:22</p> <p>personally 14:3 36:13 46:22 73:2,12 126:15 151:17</p> <p>personnel 48:7 344:9</p> <p>perspective 130:3 138:5 163:2 167:12 183:8,14</p> <p>pertain 344:11</p> <p>pertinent 31:14 33:25 180:1,2 268:14</p>	<p>perturbated 248:1</p> <p>peter 207:5,8</p> <p>pg 354:4</p> <p>ph.d 1:10 4:5 6:17 27:11 37:6,9,22 38:6 41:19 353:5,13 353:17 355:7</p> <p>ph.d. 354:2</p> <p>phase 208:22</p> <p>phd 5:5 219:21</p> <p>phone 14:18,22 31:20,23 63:15 63:16 275:14</p> <p>photo 146:3 151:10</p> <p>photographs 144:16</p> <p>photos 4:9 76:6 76:9 143:7 172:18 305:10 305:13,15,21 322:4,23 323:5</p> <p>phrase 281:21 282:13</p> <p>phrased 225:6</p> <p>physical 184:13</p> <p>physically 47:5</p> <p>picked 81:12 145:15</p> <p>picture 107:8 109:16 147:15 148:12 153:4,5</p>	<p>153:11,12 160:19 164:3</p> <p>pictures 104:20 145:15 322:20</p> <p>pin 137:20</p> <p>pinhole 81:25 82:4</p> <p>pipe 119:4 138:22 139:3 139:19 140:1 142:19,23 143:15 145:24 146:14 147:22 147:23,24 148:5,8,10,14 148:18,19,25 150:16 151:7 151:18 152:1,9 152:15 153:2 157:14 158:3 160:6,8,13,15 160:21 161:10 161:17 163:14 163:15,17,18 163:22 164:6 165:6,12,17 168:21 169:5 169:13,16 176:13 275:24 284:20,24 285:1,4 287:3 287:15,21,24 289:4 303:24 304:19,22</p>	<p>305:8 317:22 318:7 334:2,18 336:12</p> <p>pipes 163:20 272:6,11,12,15</p> <p>pivotal 10:20</p> <p>place 16:5 20:16 115:1,17 219:25 220:2 353:10</p> <p>plaintiffs 2:2 3:3 6:7 12:20 12:25 13:9,15 25:19 36:13 272:22 273:1 275:10 336:24 336:25 337:5 338:6,7</p> <p>plans 99:25 100:5 158:9</p> <p>plant 62:21 65:7 66:7 77:8 77:12,17 78:3 78:9,13 92:5 92:22 93:13 99:1 100:3,4 100:15 102:7 102:12 103:23 122:23 123:4 125:12 126:8 133:25 149:4 150:16 151:6 184:9 185:5 195:15,20</p>
---	--	--	--

196:20 205:12 208:16 212:3,5 215:15 218:22 226:6,10,15 228:16,23 230:3 239:18 240:1,3,20 242:6 244:4,8 244:12,16,22 244:23 245:20 246:22 247:4 247:13 248:21 250:2,7,24 251:3 253:13 253:21 254:12 255:25 256:16 257:12,19 258:3 259:4,6 260:19 266:14 283:19,20 321:23 328:15 329:10 331:16 332:13 333:2 333:24 334:12 335:2,7 336:10 338:12 344:5,8 plants 51:4 60:12 65:11,20 75:1 98:7 99:14 100:6 184:6,11 185:9 216:12,15 217:23 248:10 251:17,18	284:7 344:15 347:24 play 326:15 333:22 please 6:4,25 8:24 9:8 10:2 16:21 17:17 21:4 22:3 77:23 105:23 106:5 114:9 154:16 216:4 229:18 235:2 259:14 264:6 264:16 277:9 300:11 321:2 324:25 332:25 352:14 plg 4:3 16:11 62:9 207:18 point 4:8 12:22 22:24 23:1 24:2 55:18 72:13 77:8,13 92:20 95:6 98:8 100:15,25 102:4,11 103:18,23 134:20 135:2 140:25 145:1 145:21 146:4 147:3 149:13 150:15 151:5 156:1 160:6,13 164:1,6,9	196:20 197:7 200:4,4 213:15 223:10 226:10 226:15 235:9 236:5,11 237:1 237:18 242:6,9 242:23 244:12 248:7,9,18,20 250:23 251:2,9 257:3 258:21 262:17 264:24 265:5 281:9 289:6 300:19 301:9 305:6 311:25 322:11 323:1 331:5,15 332:12 333:24 335:2 338:12 340:20 342:4 342:14,21 343:1 346:11 pointed 146:11 153:8 pointing 145:7 265:19 279:14 296:14 points 118:16 236:6 237:1 239:15,25 240:17 249:16 256:12 289:12 336:5 pomm 131:2	pommerenk 131:3,16 207:5 207:8 209:5 231:25 345:1,5 pommerenk's 131:9 209:11 pond 171:16 189:23,23,24 191:19 192:20 192:24 193:3,5 193:10 197:4 197:12,22 198:3,4,22 203:13,23 204:1 317:1,5 ponds 189:13 189:15 190:20 191:2,4,13 192:11 193:3 199:10 position 288:11 300:24 321:15 possibility 94:15,20 121:4 134:23 135:18 135:20 136:25 152:25 222:12 311:18 348:7 possible 95:3 136:1,4,6,8 151:20,25 152:4,11 155:17 191:2 198:3,8 200:18
---	---	---	---

<p>202:2 206:6,7 215:7 232:16 233:14 279:8,9 possibly 11:4 94:25 95:2 135:17 201:20 202:24 206:9 224:23,23 250:14 post 98:25 231:8 postman 2:17 potential 60:9 60:21,23,25 127:8 139:14 139:15 215:12 220:21 221:16 222:5 230:15 potentially 153:24 277:6 305:1,2 powerpoint 40:2,6 practical 329:9 329:25 practice 23:24 329:23 practices 48:19 50:1 practicing 185:7 pre 98:25 134:2 290:3,12</p>	<p>precipitant 217:1 225:21 precipitate 222:14,16,19 222:20,21,24 precipitates 226:1 precipitating 225:2 precisely 143:19 predict 89:14 89:14,14 predominantly 217:14 preferred 276:18 287:6 premise 79:12 204:7 prep 12:1 20:4 preparation 11:2,15 28:3,7 31:3,5 prepare 10:12 11:11 324:21 prepared 155:6 324:24 preparing 26:9 26:16 119:21 prepping 21:9 presence 311:11 present 2:13 11:25 36:10</p>	<p>124:16,21 217:4 218:5 219:6 presentable 63:11 presently 35:25 presidents 49:18 pressed 54:8 213:3 pressure 68:25 81:4 109:23 112:22 175:25 176:1 282:2 283:14 284:8 286:21,22 287:20 pressures 176:14 pressurization 328:18 pressurized 115:9,11,13,16 pressurizing 284:18 prevent 7:23 prevents 328:18 previous 165:8 previously 15:11 26:2 162:14 primary 259:16</p>	<p>principle 88:16 188:3 principles 185:10 print 117:3 prior 18:19 30:5 73:25 74:6 99:4 164:1 172:19 173:13 259:9 270:24 271:7 274:16 275:4,7 287:1 288:6 292:11 293:16 295:12,17 310:22 311:1 325:17 333:13 privilege 20:22 privileged 20:17 probable 136:11 215:8 probably 24:9 81:11 123:18 137:14 144:9 153:23 167:17 192:21,21 201:17 202:21 208:16 212:10 337:3 problem 38:13 38:15 procedural 324:3</p>
--	---	--	---

<p>procedure 5:10 process 65:14 65:18 85:22 89:4 92:4 162:22 165:1 166:20 167:21 208:19 229:23 234:6,11 235:10,18 237:24 244:9 246:9 257:6 261:1,16 262:6 262:18,25 263:10 265:1 285:25 286:5 308:18 processes 90:7 99:21,23 184:13 208:15 246:17 320:9 produce 257:7 produced 98:4 product 147:10 267:14 professional 35:25 36:10 41:11,14,17,21 42:24 47:8 65:24 137:25 150:8 201:6 216:20 239:4 249:25 301:13 308:10</p>	<p>professor 7:10 36:3 38:7,7,12 40:17,23 65:22 184:16 program 44:21 progression 269:7 project 43:18 43:19 44:4,13 44:19,23 45:4 47:3 123:3 207:10 245:3 320:14 321:17 344:11 projects 43:3,6 274:25 promote 64:12 propeller 90:10 93:14 proper 189:12 189:16 property 8:4 84:25 proportion 82:11 proportional 303:12 propose 249:2 proposed 303:9 proposing 273:18 proposition 101:9 339:7</p>	<p>propounded 6:19 protection 44:17 174:11 provide 32:23 33:10 248:25 283:14,21 284:8 340:13 provided 19:20 65:3 98:16 123:23 155:4 181:8 268:20 268:25 349:10 provides 251:11,12 providing 40:11 public 353:16 353:20 publicly 273:22 published 38:2 38:4 pull 324:15,15 327:21,21 pulled 96:20 242:14 pulls 97:24 pump 70:24 278:6 279:6 280:21 281:5 283:22 284:10 286:21 288:25 289:24 346:2 347:20</p>	<p>pumped 280:19 pumping 253:14,22 254:13,23 255:3 347:20 350:22,25 351:12 pure 156:7 purpose 63:21 63:23 66:3 109:10 126:22 127:5,25 128:4 232:5 pursuant 5:9 pursue 289:20 pushed 115:23 pushing 175:13 put 17:5 27:1 40:3 71:20 80:21 91:16 109:18 131:18 154:22 176:8 212:22 224:1 245:22 287:15 301:20 putting 162:23 246:1 puzzled 289:19</p>
q			
<p>q1 24:5 qualification 141:18</p>			

<p>qualified 129:23 qualify 51:2 141:13 283:24 quality 38:20 127:16,20 340:11 quantifiable 139:7 quantification 180:1 quantified 216:19,22 quantify 89:18 200:18 202:2 quantitatively 212:18 quantity 38:20 348:2 quarterly 24:3 24:4 quazi 41:4,5 ques 114:6 question 9:9 10:1,3,5 13:12 17:24 20:16 21:23 23:21 24:25 33:4 53:17,21 58:13 58:14 59:5 61:1 73:14 78:5,8 86:19 87:1,3 88:11 88:19 102:17</p>	<p>111:7 122:15 122:19 126:5 168:17,18 170:7,12 175:2 175:3 180:9 200:1 214:16 223:17 225:6,7 225:15 227:11 232:19 233:7 233:18 239:24 252:10 253:18 254:1 256:18 266:9 267:7 287:25 291:19 292:2,23 293:6 309:11 318:2 323:12,23 328:2 339:18 questioning 346:11 questions 6:19 9:7,23 16:21 21:1 65:1 95:23 104:25 105:11 174:15 188:10 228:6 245:17 269:9 321:2 324:13 328:25 330:11 330:16 331:3 342:10 350:21 quick 185:12 241:11</p>	<p>quickly 175:17 187:5,13,14,18 187:22,25 188:7 quiescent 166:13 quite 232:4 337:9 quote 236:15 238:21 242:14 quoted 238:8</p> <p style="text-align: center;">r</p> <p>r 2:1 4:1 7:6 353:1 354:1,1 355:1 railroad 7:16 7:22,25 8:1,3,8 8:9 raised 227:11 raleigh 2:11 range 42:15 43:7 131:25 132:24 180:4 190:1 200:1,3 202:10 203:6 256:1 rapid 187:3 rare 81:16 rate 85:24 86:5 86:11 87:6,15 87:23 88:3,4 89:10,15 110:22 111:3</p>	<p>166:20 180:22 181:1,23 188:6 188:16 189:4 200:19 201:18 202:3,16,22 203:15 204:3 205:17 208:25 209:1,14 276:10,12,24 347:20 rates 96:15,16 343:22 346:3 rather 8:20 131:23 171:9 209:23 345:6 ratio 64:12,17 67:24,25 68:1 79:24 110:4,11 113:2,21 213:8 ration 64:18 raw 66:12,22 92:13 96:21 103:24 109:22 110:2,9,23 111:10,17,22 112:12 133:20 133:24 134:1 134:21 166:13 171:18,25 218:7 243:4,10 244:7,20 247:14 254:25 255:5 256:5 257:4 258:7</p>
---	---	--	---

<p>338:23 339:2 340:14 341:10 341:13,20 342:3,13,20,25 reach 63:18 79:13,20 81:8 110:3,10,16 111:2 113:1,20 189:21 reached 268:13 reaches 212:13 212:16 reaching 63:22 100:24 215:16 268:17 345:7 reactor 97:3 152:10 167:11 183:13 184:6 245:24 read 9:15 12:11 31:8 51:7 52:9 52:12,15,16,19 52:24 53:8,18 58:17 59:6 66:25 76:4 87:4 123:17 125:8 139:6,14 142:4 155:14 155:24 162:14 171:21 174:13 174:21 175:4,7 175:17 229:5 230:18 235:15 242:20 255:15</p>	<p>262:21 269:18 269:19,24 270:8 275:5,8 275:16,18 282:4,13 283:8 290:24 295:9 298:23 305:16 305:21 319:22 322:4,8 332:25 334:8,9 339:19 353:6 reading 12:21 16:13 53:23 175:22 259:22 reads 51:1 66:19,21 125:3 138:20 161:9 166:13 174:20 175:25 187:2 208:14 230:12 235:8 242:2 255:10 260:10 292:22 293:23 300:18 ready 337:9 reaer 197:20 198:8 reaeration 189:12 190:11 190:19 191:9 198:2,8 199:9 203:13,23 204:1 330:19</p>	<p>realizing 175:19 really 13:21 54:8 55:2 75:22 76:25 77:3 213:7 228:5 291:25 realms 152:25 reason 10:8 75:7 79:23 102:10,20 155:23 197:16 198:11,20 206:13 217:19 250:13 278:20 327:4 329:24 354:4 reasonable 8:24 9:1 149:12 150:1 reasons 143:12 rebuttal 4:4,6 4:15,19 10:14 23:6,10 27:11 28:16 30:5,15 72:12 73:25 74:6,12 75:13 75:17,17 155:6 155:9 156:4 229:5,8,14 236:18 275:19 300:10 311:1 326:15,22 346:15</p>	<p>rebutting 75:13 recall 12:15,21 15:8,14,25 23:13,17,19 25:5,10,13,18 25:20,22 26:6 30:2,9 34:16 45:14,21,25 47:9 53:15,23 54:25 55:14,22 63:13 64:10 79:5 96:5 98:5 99:12,24 100:5 101:6 120:5,9 172:23 178:8,9 178:23 179:1,4 179:8 181:9 199:7 223:8 226:7 245:15 259:13 271:14 275:18 291:19 291:25 297:20 299:13 305:14 316:5 319:13 321:9 322:7 329:3 330:15 346:19 350:4 recarbonated 206:17 recarbonation 63:24 64:1,3,4 64:9,13,23 65:1,4 66:2 67:15,19 92:14</p>
---	--	---	---

145:22 149:3,7 149:10 158:2 205:21,22 206:3,11,23 207:2 208:18 208:24 209:5 209:12,18 210:2,9,18 211:11,17,23 212:2,12,16 213:19 214:4 214:10,15,20 215:2,4,6,9,17 331:4,5,19,24 332:13 333:3 333:12,16,21 333:25 334:4,9 334:11 335:5 335:22 336:2 336:10 recarbonations 206:18 receive 29:24 29:25 42:10 received 29:12 36:24 37:3,6 45:11,15 49:25 67:13 76:6 124:9,12 155:22,23 269:4,15 receiving 18:20 45:8	recent 144:16 recognition 42:9,11 recognize 17:2 27:14 28:19,24 99:10 186:17 207:24 329:25 recollection 7:20 11:6,10 30:19 54:25 98:20 117:6 177:22 326:8 327:1 350:9 recommendat... 209:12 230:14 recommended 24:3 208:23 reconstructed 236:6 242:3 252:12,18 253:1 record 6:3,5,25 17:6 18:6 21:14 42:8 95:9,13 154:15 154:17,21,23 154:24 184:2 185:15,16,20 241:13,17 264:9 292:24 302:1,5 335:21 347:13,14,16 347:18 349:9 352:5,8	records 13:21 15:25 16:4 17:3,7,8 18:17 18:19 19:2 23:22 42:15 43:11 44:25 258:13,14 reduce 90:21 190:11,16 reduced 204:8 334:3 reducing 144:6 149:7,19 323:4 reduction 303:9 refer 15:24 18:17 19:2 20:11 61:17 62:1 113:5 123:11 160:23 182:4 205:4 266:2 271:1 272:7 277:18 310:15 315:8 337:16 reference 34:2 57:11,14 64:25 140:24 209:18 210:1 267:15 271:4 277:10 286:11 290:7 290:13 300:25 301:3 337:25 346:13	referenced 96:3 188:15 207:5 222:8 326:5 338:8 342:19 343:21 references 57:18 267:20 267:21 271:17 referencing 92:10 108:22 163:19 177:18 186:18 214:23 346:17 referred 137:19 139:12 140:8 181:7 referring 32:8 61:18,22 62:2 204:22 210:24 261:14 316:6 317:24 318:10 320:6 338:11 338:19,20 345:1 refers 128:17 refresh 12:16 170:21 326:25 regard 234:15 343:2 regarding 43:3 266:19 271:23 328:9 333:23 338:1 340:14 344:13
---	--	---	--

regards 321:11 regime 195:3 region 174:1 regular 7:9 68:15,21 69:2 160:2 208:4 279:23 280:3 290:18 reich 2:16 reinforced 228:2 343:3 relate 155:21 350:17 related 14:5 26:1 45:19 46:3 52:1 77:8 77:13 78:8 127:7 141:9 196:24 303:18 323:20,25 relates 57:4 138:2 165:1 relating 52:24 relationship 316:12 relative 64:2 129:6 131:14 131:15,15 137:14,15 139:5 140:10 158:2 224:16 274:13 310:17 312:21 355:14	relatively 246:23,24 311:11 released 35:3,4 35:14 relevant 270:1 327:10 reliance 156:1 270:19 271:4 271:17 351:14 relied 91:15 101:13 103:20 143:4 155:7 156:9 172:21 189:11 289:13 relies 303:10 rely 20:24 21:5 21:10,24 100:23 143:9 267:25 268:7 relying 98:5 101:7 145:16 155:21 261:22 326:21 350:16 remaining 166:20 remeasure 244:22 remediation 45:18 46:4,9 47:18 48:9 73:8 274:25 remember 17:18 38:1	43:11,13 47:14 52:22 54:3,5,8 54:9,20 58:9 65:13 72:9 79:11 82:15 101:16 122:6 166:8 172:22 199:12 220:18 232:4 259:12 259:24 272:8 313:14 328:1 346:18 remembering 13:3 220:23 259:2 reminder 323:22 reminds 176:9 remotely 12:3 31:19,22 removal 125:11 126:8 208:6,10 208:15,17,21 209:1,14 316:7 343:22 removals 138:21 139:2 remove 209:6 216:25 217:20 220:3 306:21 308:9 315:23 316:4 317:1 removed 221:1 316:19,23	removing 220:6 317:4 remy 2:17 266:18 rent 109:21 repeat 56:12 69:22,22 72:3 195:18 225:11 248:8 309:10 321:2 repeating 130:23 rephrase 36:18 113:13,15 170:11 223:17 339:18 replace 69:9 172:5 reply 6:19 report 4:4,6,16 4:19 10:14,18 10:20,25,25 11:1 18:21 19:3,5 23:6,10 26:10,16,23 27:11,15 28:3 28:6,16 29:18 30:5,15 32:14 32:25 33:14,17 33:18,25 34:13 34:21 41:19 50:17,20 58:17 58:21,22,25 59:6,8,9,11,16
--	---	---	--

72:12,17 74:1	229:14 233:5	331:9,16,17	represent 8:13
74:7,12 77:1	234:19 235:3	332:15,18,22	116:25 260:11
78:19 79:3	236:6,8,16,19	332:22 333:6	271:5
82:10,25 89:4	236:23,25	333:11,18,18	representative
91:2,10,11,16	238:22 241:19	337:13 338:8	304:6 327:13
91:22 92:11	242:14,18	338:11,18	represented
98:5,13,24	243:1 248:17	340:15 342:7	131:2 304:9
99:5 100:11	255:9,18 256:3	343:12,13	representing
101:12 103:7,9	256:10 258:24	344:19,23	150:20 151:10
105:11 123:7,7	259:10,11	345:20 346:15	represents
123:9,11,13,17	260:1 261:2,10	348:12 350:8	242:7
124:8,25	261:18,22,23	report's 277:9	request 4:21
127:23 128:5,9	262:8,23	reported 1:22	17:8 18:9
131:8,19 132:3	263:12,23	330:23	24:10 40:5,10
133:19 134:2	265:8 266:3,23	reporter 5:8	40:13,15 327:4
134:18 135:8	266:23 270:25	6:15 8:17 9:2,6	required 125:6
138:17 140:11	271:7,11,13	17:16 58:24	125:13,23,25
140:25 143:3,8	272:9 275:18	72:3 73:16	126:9
144:12 145:8	275:20,23	105:2 138:11	requires 267:1
155:6,9 156:4	279:22 281:16	214:13 248:8	requiring
158:8,11	285:22 288:8	309:12 336:15	283:22
159:20 166:7	293:19 294:23	340:6 349:12	reread 236:25
170:23 172:20	295:3 296:9	352:7 354:3	research 36:2
173:13,22	298:8 300:10	355:5	39:9 43:19
178:10,14	302:6 304:25	reporter's 3:11	44:15 49:3,5,5
179:15 182:4,5	305:23 306:2	reports 10:15	73:8 208:23
182:6,18,19	309:25 310:19	10:17 18:20	209:12 268:23
188:14,20,21	310:22 311:1	19:16 52:9,12	269:13 273:18
189:3 190:15	314:1 319:23	52:16,20,24	274:10,13
197:8 203:20	320:5 321:10	53:8,22 98:4	284:3
204:12 210:14	321:11 325:11	98:12 214:6,8	researcher
214:24,25	325:15,18	258:17 263:15	273:16 274:2,7
215:21 227:22	326:7,15,22,23	266:18 275:16	274:8
228:12 229:6,8	327:2,3,6,7	350:3	

reservoir 71:4 71:6 90:25 91:5,20,23 92:13,16 93:1 93:5,10 96:2 96:14,17,23 97:8,18,25 99:3 100:20 103:24 104:2 106:14,25 107:14 108:1 109:13,22 110:2,9,23 111:10,15,17 111:23 112:13 167:6,8 177:16 179:2,4,5 182:3,18,25 183:2,5,7,10,16 186:4 190:2 192:2,19,20,23 193:8 194:17 195:8,15,20 196:9,21 197:7 198:6,25 205:1 205:2 244:23 329:10	177:10 178:20 179:13,15 180:3 181:5,12 182:9,10,11,23 185:24 197:11 199:16 204:15 204:20 205:9 205:10,11,15 254:25 255:6 328:14 344:18	restate 59:3 302:22 318:2 restriction 335:19 rests 264:23,25 result 14:2 206:9 resulted 13:25 resulting 162:2 results 201:15 202:19 260:10 303:7 342:11 351:1 resumé 34:22 42:17,22 43:15 retained 14:25 15:5 125:4 343:17 retired 40:22 41:4,5 62:22 62:24 184:21 retirement 40:24 reused 226:6 reusing 261:6 reversal 48:10 reverting 48:4 review 11:2,8 30:3 31:4 34:14 55:7 78:22 98:23 101:12 130:21 140:8 143:7 233:8 263:14	271:21 273:10 273:16 320:4 325:9 343:19 350:3,7 reviewed 10:14 10:18,19,21 11:6 28:3,6 29:3,7,19 30:10 31:2 53:18 54:16 76:9 101:11 143:11 261:23 262:23 271:6 325:17,17,25 326:6,22 346:14 348:11 348:19,20 349:16,16 351:7 reviewing 10:24 reviews 174:16 175:21 rewrite 63:11 rice 2:14 richard 4:12 186:14 rig 153:24 154:7,10 right 7:22 8:1 15:6 18:1 24:20 28:2 64:21 68:3 76:5 77:18
reservoirs 60:12 72:18,21 93:18 94:18 96:7,21,22 99:6 115:19 134:21 166:10 166:14 167:1,5	resistance 317:14 resource 204:25 205:4 resources 323:17 respect 230:22 respective 5:4 respond 231:7 responding 10:19 227:4 313:25 response 4:15 75:8 130:16 200:1 208:13 226:12 240:6 254:16 266:18 328:25 responsible 160:21 responsive 170:6 rest 27:18 156:7 242:20		

<p>92:21 95:20,25 97:13 107:18 116:1 136:9 141:22 153:5 157:12 160:1 163:23 177:19 197:5 231:25 242:16 280:6 281:8 293:7 297:20 324:21 326:1 327:19 331:17 337:4 346:19 349:1 350:18 352:7 rim 158:3 ripple 194:14 ripples 193:21 193:24,25 194:15,19 195:9 rises 71:24 176:2,21 rising 71:16 river 171:17 189:22 191:19 192:17 193:20 197:12 330:22 330:24 rivers 191:12 robinson 355:12 role 36:19 40:23,24 43:18 44:10 63:1</p>	<p>333:22 roles 35:25 36:10 room 121:15 roughly 15:21 18:14 25:14 65:20 123:18 250:16 291:19 rounded 132:13 row 238:17 306:2 rule 21:25 rules 5:9 running 333:22 335:8 runs 16:11 101:21 116:20 207:18</p> <hr/> <p style="text-align: center;">s</p> <hr/> <p>s 2:1 3:1,13,13 4:1 5:1,1 7:6 354:1 sabatini 1:10 4:3,4,6 5:5 6:2 6:11,12,17,24 7:1 16:11 17:2 20:12 21:4,19 27:11 28:16,19 32:7 41:19 54:5 62:9,10 95:15 101:23 104:10 109:8</p>	<p>155:20 157:3 166:8 168:19 171:24 174:2 175:14 184:20 185:21 186:16 207:21 211:9 251:14 300:11 301:21 324:4 324:13 340:2 352:2 353:5,13 353:17 354:2 355:6 sabatini's 155:6 safer 153:23 sake 20:11 salary 41:6 sample 22:15 22:19 240:17 243:11,21,22 244:6,7 249:5 249:23 250:21 samples 57:7 235:10 236:10 243:3,5,9 244:11,14 245:9,13 247:13 252:4 252:17 253:7 255:12,24 256:20 258:7 260:2 262:18 262:24 263:17 264:1 320:22</p>	<p>321:6,13,21 338:1,12,20 339:4 340:15 341:10,13,21 342:4,11,13,20 343:1 345:19 345:21,23 346:4 348:1,4 348:5 350:15 351:14 sand 94:2,6 103:3 219:22 223:3,13,16,19 sands 37:21 sanitary 174:11 saw 75:24 197:16 259:9 259:22 275:1 291:1 293:10 305:10,13,15 saying 49:16 56:24 71:25 72:5 111:14 131:14 132:22 133:13 137:24 137:25 138:6 139:6,13,14,15 141:13 145:6 155:23 165:18 193:23 197:3 202:8 203:5 231:25 238:9 247:23 251:15 256:22 329:3</p>
--	--	--	---

335:24 349:11 349:14 says 6:19 20:3 20:13 22:10,15 22:19 23:6 24:13,18 56:22 59:14 91:19,23 102:4 117:17 118:1 119:16 125:22,22,24 131:23 133:17 146:12 150:15 151:5,6 162:13 171:14 201:5 202:14,18 204:13 223:12 223:14 238:18 255:22 260:6 264:10,20 271:20 279:15 279:22 280:3,6 280:14,18 281:21 283:2 285:24 286:3 286:18 288:22 291:18 295:3 297:4,14 298:20 299:17 306:2 308:8 316:7 325:1 339:20 scenario 163:15,16	schematic 84:6 92:9 99:19 100:16 102:11 134:25 140:15 152:5 331:8 schematics 92:8 99:13,15 99:20,22 158:9 schwartzena... 222:8 scientists 42:5 scope 78:18 127:2 129:21 232:25 233:16 233:23 234:18 237:9,16 239:13 259:20 343:17 seal 355:16 sealed 82:20 83:1,6,13 116:4 search 314:25 343:20 searched 313:16,16 searches 268:18 searching 313:8 second 19:24 24:12,16 32:23 56:21 57:3,17 59:14 66:21	68:7,12 108:4 118:6 138:20 162:13 170:25 171:14 174:20 175:24 196:6 202:18 204:13 227:20 228:3,4 228:9,11 231:7 242:2 256:7 266:22 281:9 297:14 298:19 337:11,16,24 340:12 347:13 section 229:22 235:7 277:17 279:21 283:2 285:3 336:12 344:5 security 38:20 39:18 sediment 308:9 315:23 316:4,7 316:15,19,22 317:2,4 see 20:1 22:8 22:13,17,21 23:8 30:25 40:12 59:17 77:4 89:6 100:21 102:3,8 102:25 103:3 103:13 106:6,7 106:21,24 107:8,13,17,22	107:25 108:6 117:20,25 118:7,11,13 125:22 126:1 128:15,22 132:1 133:7 138:19,24 144:5,17 145:1 145:16 148:23 150:15 151:5 155:5 156:25 159:23 160:1 161:13 166:13 166:23,25 168:12,20 174:9,18 175:24 176:4 178:5,7,15 183:8 187:6 190:22 200:21 201:1,21,23 202:1 204:18 208:7,12,14 209:2 212:18 215:16 229:24 236:12 242:11 249:6,7,8,10 252:13,23,24 255:22 260:15 263:9 271:25 279:10,24 280:8,16 281:13 283:2 285:24 286:8
--	---	---	---

289:20,21	106:13,13,24	236:14,15	281:23 288:23
290:22 293:2	108:24 117:5	242:13,13,20	342:20
294:1 299:15	172:18 174:2	255:9 260:9,15	shakes 90:23
300:21 303:21	174:14 186:22	264:12 271:19	shaking 8:20
306:4 307:11	195:7 207:22	281:9,20 286:8	264:6,8
314:16 316:19	210:7,16	286:18 297:14	shape 107:24
316:20 317:7,8	211:16 233:8	298:19 300:18	shaped 108:18
317:9 320:5	250:1 254:10	301:2,6 332:25	sheet 3:10
323:3 327:11	254:19 271:5,6	334:8	160:2
335:9 338:2	274:20,22,24	separate 32:16	short 7:17
341:5,14 347:9	284:2 305:21	33:13,20 242:7	38:24 39:11
348:16	306:24 307:2	260:12 270:3	47:12 58:3
seeing 147:25	322:3 333:9	283:22	95:11 185:18
148:12 310:14	selected 143:12	separated	241:15 302:3
332:11	semester 50:7	53:12 105:2,3	shortened
seek 76:13,19	184:24 185:1	series 118:1,20	117:3
seem 8:25	seminars 50:7	served 46:22	shorter 81:24
108:15 176:12	50:8,11,12	serving 12:8	shorthand 5:8
188:10 245:25	sense 127:10	set 28:11 34:17	355:5
351:9	131:14 138:7	51:22 55:23	show 39:20
seemed 131:15	156:23	103:21 128:6	79:3 125:21
213:20	sent 24:1	178:21 213:17	128:25 160:24
seems 100:2	153:19	233:5 242:7	210:22 248:19
108:16 117:14	sentence 50:25	243:1 256:4	257:10 302:7
118:24 120:13	125:3 126:1	setting 13:7	327:15 348:2
175:23 262:4	131:22 132:1	96:8	showed 177:14
263:23,23	138:20 161:8	settling 226:6	177:23 178:1
279:8 301:1,5	162:14 163:3	seven 177:25	311:5
351:5	171:14 174:20	178:3	shower 10:23
seen 28:22	175:24 187:2	several 7:11	306:8 312:1,3
62:10 65:4	201:1 202:18	12:23 35:21	312:13,17
73:5,23 76:25	204:13,22	43:10 48:24,25	313:3,5 314:10
78:1 101:25	208:7,9 230:9	54:9 101:16	315:8,9,25
104:11,15	235:7 236:12	245:16 274:12	316:9,11

<p>318:19,20 showerhead 306:15,19,23 307:18,24 308:2 310:7 316:17 317:6 showing 108:11 108:13 145:1 254:11 303:21 shown 100:19 135:13 136:19 164:9,11 260:10 286:4 shows 145:6 159:23 165:23 166:3 168:5,8 252:13 296:22 299:11 304:14 331:19 335:16 335:25 sic 104:21 side 27:2 28:11 37:17 80:7,15 81:25 107:18 204:17 234:2 246:13 259:5 sign 9:17 signature 341:17 355:18 signed 325:11 325:15 341:15 significance 295:3 340:14 342:24</p>	<p>significant 64:9 138:20 139:2,8 139:10,11 140:16 251:5,8 251:11 341:12 341:20 significant's 139:5 signing 325:18 326:6,22 silverstein 2:15 similar 80:6 104:14 106:13 106:23 111:10 111:23 112:13 115:3 190:1,2 257:13 259:5 313:18,21 314:8,9 328:13 328:14 similarities 314:16 simulated 252:14,25 260:3 simultaneous 58:23 138:9 213:14 214:11 245:8,13 simultaneously 243:4,10 247:14 site 150:7 221:23 327:5</p>	<p>332:12 344:10 sites 39:21,22 39:24 44:1 47:6 304:10 sitting 53:23 74:17,20 78:21 101:3,6 143:24 193:7 212:25 213:11 217:9 223:6 265:23 267:21 309:21 313:15 323:7 346:8 situ 200:17 situation 83:22 85:21 190:3 303:7 314:2 situations 201:16 202:20 six 35:3,5 155:5 208:9 324:9 sixth 208:5 size 107:24 111:18 190:5,6 190:7 212:6 304:1 316:9,11 316:18 sized 112:6,14 skill 273:8 skills 273:19 sliced 112:5 small 80:22,25 81:7 94:10 112:11,16</p>	<p>148:22 161:9 172:9 176:13 248:25 287:16 smaller 196:7 201:19 202:11 202:23 203:7 315:24 316:10 316:16 317:6,8 317:10,13,13 317:16 softening 102:7 soil 51:18 solids 216:24 217:6,11 218:15 219:1 solution 225:25 226:2 solutions 22:12 someone's 129:17 130:9 138:2,7 somewhat 176:12 277:3 soon 24:8 sorb 218:16,25 219:12,13 222:1 223:22 sorbs 220:16 sorption 37:19 215:19,20,22 216:5,11,14 219:21,25 220:2 221:3,17 221:19,23</p>
---	---	---	---

222:5,6,9 224:21 sorry 6:13 12:13 14:11 17:20,22 36:16 38:14 50:19 58:22 72:3 73:18 94:5 123:16 124:3 135:6 138:13 144:22 145:4 145:11 150:23 153:16,17 154:4 159:6 170:8 171:3,5 173:10 183:25 183:25 195:18 206:1 210:15 214:13 225:10 228:19 230:5 235:4 238:15 243:16 251:14 252:9 253:9 256:17 259:7,7 270:14 274:23 282:16 291:10 292:16 296:10 297:2 298:7 307:19 321:1 325:24,24 326:2 332:6 337:10 340:6 344:24	sorts 152:19 sound 293:6 sounds 13:19 58:16 62:5 source 13:18 100:23 218:12 259:17 280:15 280:18 281:12 281:24,24 282:6,14,19 283:5,9,11,12 283:24 284:23 289:3 290:1 300:23 317:2 347:21 sources 98:6 276:1 297:20 southern 1:2 southworth 171:7 space 79:13 81:5 115:9,15 speak 8:25 13:5 17:23 25:3 151:16 158:5 158:10 164:19 209:15 212:4 264:11 269:8 speaking 8:25 9:11 25:22 26:6 105:21 129:16 speaks 239:20	specialty 37:16 specific 11:5,7 13:12 15:25 45:21 54:3 76:18 119:3 175:2 194:9 specifically 13:4 23:17 54:14,18 55:3 92:1 101:16 120:2 155:7 156:8 220:19 274:10 286:19 specifics 54:8 127:17 305:14 speculate 55:1 301:19 314:16 speculating 215:11 217:7,8 speculation 216:17 306:18 314:12 speculative 83:19 85:5 218:20 219:4 310:13 319:1 348:6 speed 113:8 spent 15:22 49:14,24 spiliotopoulos 58:18,21 spiliotopoulo... 59:2,9	spinning 90:9 spiractor 10:22 138:21 139:3 139:19 140:1 140:17,23 141:14 142:13 142:18 143:15 145:1 148:10 149:1 150:16 151:7,18,21 152:1,2,16 153:2,2 157:14 157:15,21 161:11 163:21 165:6,11,17 167:3 216:24 216:25 217:4,6 217:11,19 218:15 219:1 219:11 220:8 221:1 222:14 222:24 224:25 225:9,17 306:12 322:11 322:15,25 323:9,9 327:15 334:2 335:8 336:1 spiractors 72:25 92:13 93:21 103:1 141:10 166:15 222:17 331:20 334:6
---	--	--	---

<p>splashing 88:24 183:6 276:15 276:16,18,21 276:23 277:6 311:5,11,16,17 312:1,2,9,12,13 312:16 315:3 315:19 318:20 344:17</p> <p>spoke 124:19</p> <p>spoken 14:9,14 14:17,21 25:15 25:18,25 124:14 275:13 323:19</p> <p>sponsors 39:9</p> <p>spray 121:10 308:2 309:6,19 309:19 310:7 318:13</p> <p>spread 306:14</p> <p>ss 353:2 355:2</p> <p>st 2:8</p> <p>stack 27:5</p> <p>staff 268:13 324:24</p> <p>stage 135:1,11 135:13</p> <p>stamp 155:12</p> <p>stamped 326:10</p> <p>stand 22:23,25 41:23 77:5 272:6,11,12,15</p>	<p>275:24 284:20 285:1,4 287:3 287:20,24 289:4 304:22</p> <p>stands 41:21,24 264:22</p> <p>start 8:23 9:9 59:14 74:23 134:13 148:21 154:23 155:2 203:24 214:13 214:17 240:15 337:1</p> <p>started 45:1</p> <p>starting 236:4 292:24</p> <p>starts 30:21 174:10 227:21 334:8 341:5</p> <p>state 5:8 6:4,25 12:20 37:4,6 209:24 226:5 236:5 243:18 245:7,8,13 246:7,17,20 247:11,21,22 247:24 248:4 248:16 288:10 290:17 298:18 298:18 317:19 318:4 343:15 347:22 352:8 353:2,6,16,20 355:2,5,20</p>	<p>stated 154:23 239:22 241:1 288:15 321:5 321:12 322:3 333:4</p> <p>statement 56:12 78:23 133:15 193:6 201:7 209:24 217:13 300:24 321:8 328:24 334:7</p> <p>statement's 126:14</p> <p>states 1:1,12 5:6 6:9 8:14 14:5 19:20 39:20 237:22 238:6</p> <p>station 43:9</p> <p>stationary 85:18</p> <p>stay 187:24</p> <p>steady 243:18 245:7,8,13 246:7,11,12,17 246:20 247:2 247:11,20,24 248:4,16 347:22</p> <p>stella 157:6</p> <p>stenotype 355:8</p>	<p>step 236:11</p> <p>stesha 2:19</p> <p>stick 77:23</p> <p>sticker 291:12</p> <p>stickers 336:14 336:15</p> <p>stipulated 5:2</p> <p>stipulations 3:5</p> <p>stop 180:8,15 253:14,22 254:13 264:6</p> <p>stops 254:23 255:3</p> <p>storage 56:5 60:1,4 103:14 103:18 128:17 132:20 134:21 169:23 174:10 177:24 185:22 186:3 191:15 192:2 230:16 264:3 284:1,4 284:11,12,18</p> <p>story 164:4</p> <p>strainer 277:25 278:4,13,17 285:14,20 287:14,25 289:19 294:18 294:21 295:6,6 295:8 300:5 301:11,12 306:14,20,22 306:24 307:14</p>
--	--	--	---

<p>307:16,20 308:1,12,13,13 308:16,24 309:9,14,23 310:6,17 315:22,24 316:3,14,16,21 316:23 317:5 317:11,13,15</p> <p>strainers 295:12,17</p> <p>straw 111:23 112:2,9,14</p> <p>stream 88:14</p> <p>strike 14:8 15:4 29:24 30:22 48:14 52:4 60:2 63:17 66:20 71:14,22 76:2 81:19 89:2 109:21 111:21 123:20 136:17 137:22 139:21,23 151:24 168:6 171:23 178:6 179:9 203:24 220:13 221:24 234:21,23 240:14 261:17 273:7 274:3,4 276:22 277:16 288:7,21 310:5</p>	<p>stripper 64:18 67:17,24 70:5</p> <p>stripping 64:11 64:11,13 79:8 213:9</p> <p>structural 37:14</p> <p>structurally 70:17</p> <p>structure 98:6 109:11 140:16</p> <p>structures 140:15</p> <p>struggle 225:1</p> <p>students 26:20 39:16 79:11 185:8</p> <p>studied 49:11 49:20 158:8 219:21 314:21</p> <p>studies 125:14 126:24 127:11 212:1 220:15 268:8</p> <p>study 11:1,1 76:23 125:7 126:10 169:9 189:8 193:4 244:18,19 245:19 247:25 258:16 302:11 302:15,18,20 302:25 303:2</p>	<p>studying 49:24 214:6</p> <p>subject 52:15</p> <p>submerged 148:25 161:10 308:14,25 309:15</p> <p>submitted 27:15 34:25 156:4 178:10 259:11 275:19</p> <p>submitting 30:5 34:12 73:25 74:6 99:4 172:19 259:10 266:24 270:25 271:7</p> <p>subscribed 353:15</p> <p>substance 246:5 323:20 323:25</p> <p>substantial 129:1,7 130:17 130:18 208:17 208:20 209:6</p> <p>substantive 324:2</p> <p>successful 44:1 236:9 237:18 238:3,9,16,18 239:7,12 242:5</p> <p>sucked 115:23</p>	<p>sufficient 112:10 113:18 113:25 114:2 114:20 122:16 122:20 222:4 268:21 269:4</p> <p>sufficiently 51:1</p> <p>suggest 136:10 162:17 195:13 212:21 251:4 251:21,25 258:5 288:5</p> <p>suggested 64:8 116:6</p> <p>suggesting 210:8</p> <p>suggestion 67:16 118:24 130:17 227:4 241:7</p> <p>suggestions 226:13 272:13</p> <p>suggests 78:1 170:25 171:6 201:14 210:17 281:25</p> <p>summaries 55:18</p> <p>summary 36:9 52:19 133:15</p> <p>superfund 39:20,21,24</p>
---	---	--	--

supersedes 286:4	27:25 32:6,21 32:22 33:2,3,4	193:14,18 194:2,12 197:2	311:16,17,20 317:17
supervisor 341:16	33:5,19 34:10 35:19,22 36:17	197:18,23 198:17 200:2	surfaces 222:7
supplement 349:21	40:14 42:16,23 45:24 49:9	202:17 206:2 206:20 216:3	surfactant 35:6 36:2,6 39:8
supplemental 28:17,25 324:18,22	53:16 54:15,17 55:11,16,21 56:13,21,25	223:11 227:19 228:20 229:2,9 230:6 234:16	surfactants 39:2
supplied 78:13 286:22	57:3,9 61:2 65:12 68:18	243:8 245:11 255:7 257:21	swear 6:16
supplies 288:24	69:23 71:5 72:7 74:5	264:17,23 278:19,25	sweeping 70:6 209:23
supply 56:8,18 57:21 135:2,12 136:20 258:8	80:14,24 83:12 87:5 95:7	282:17 299:4 301:25,25	switch 78:24 227:12 310:20
support 4:10 126:23 232:1 248:25 250:22 251:5,7,10,12 339:7 343:4,6 343:9 351:15	96:13 102:18 105:8 108:23 109:1 110:7,20 112:4 115:20 116:16 119:15 119:20 120:12	302:23 303:8 304:13 305:13 314:3 316:12 316:13 318:3 321:3,18 331:9	switches 286:5
supporting 52:21 226:18 227:1,5 257:5 299:1,7	122:8 125:19 130:6 132:15 133:5 135:7 136:15 141:19	surface 82:13 121:10 168:8 168:15 169:6 173:7 176:13 180:21,24	sworn 6:18 353:15 355:7
supports 298:20	146:25 147:11 147:17 151:4	187:24 190:7 193:21 194:1	synonymous 319:16
supposed 105:21	156:15 159:2 164:24 168:11	194:15 205:3 212:13,17,24	synthesize 273:17
surbec 45:2,4	171:5 175:18	213:2,8,13	synthesized 268:15
sure 9:2 12:18 13:6 16:24 18:2,18 21:15 21:18 27:20,21	176:11,15 178:15 179:21 181:2 186:1 188:19,22	215:16,24 216:6 224:12 277:2,3,7 310:9,10	system 68:25 70:6 71:21 78:7 84:5 90:20 97:4 99:21 120:16 120:18 144:5 192:8 194:23 194:25 235:13 237:7,15 244:3 246:18 248:1 262:20 272:23 282:3 284:6,9 284:13 286:23

<p>341:1 347:22 systematic 227:10 systems 51:4 72:14 128:14 128:17 158:6 161:22 171:16 182:15 235:9 262:17</p>	<p>tables 212:7 take 9:2,6 20:16 27:13 44:15 54:6 56:1 58:3,10 58:15 63:10 78:25 81:19,20 82:6 95:5 111:1 146:17 153:4,5 174:13 175:20 182:9 185:11 186:7 196:9,15 211:24 215:21 227:14 241:11 247:9 260:22 301:8,11 312:5 taken 1:12 5:5 41:13 48:23,24 74:1,7 146:3 150:21 151:11 243:3,9 247:14 274:12 326:19 338:13,20 339:4 342:20 345:24 355:8 355:11 takes 181:21 221:23 253:13 253:20 254:11 talk 8:24 24:18 39:16,19 40:8 63:19 66:1 79:7 97:3</p>	<p>205:1 210:23 224:2 261:4 262:11 263:12 265:7 324:14 talked 75:23 100:14 166:9 182:8 267:3 273:25 274:20 284:6 350:18 talking 26:17 49:22 66:3 81:6 85:10,11 88:13 127:22 152:24 157:13 163:22 205:10 220:9 245:1,25 252:17 277:20 310:20 318:8 319:13 331:10 333:15 337:22 talks 261:3 tank 69:13,18 69:25 70:9,12 70:19 117:16 118:1,10 119:17 166:13 175:25 176:3 176:14 177:25 180:5,22 185:22 191:25 192:2 194:17 205:7 279:23 280:4,7,14,18 282:13 283:2,8</p>	<p>283:13,14,17 283:21 284:1,4 284:11,12,18 294:4,14 297:15 tanks 68:14,20 69:2 72:18,21 103:15,18 132:20 169:23 171:18,25 172:13,19,25 181:13 182:23 186:3 191:15 199:16 204:14 205:15 284:8 344:17 tap 120:23 121:7 tape 147:20 tapped 282:2 tapping 284:20 tarawa 22:16 55:18 77:9,13 98:7 235:8 248:7,10 255:8 255:11,25 257:11 258:7,9 258:19 259:17 260:19 261:12 261:19,25 262:16,25 263:18,24 264:1,25 265:24 320:21</p>
<p>t</p>			
<p>t 3:1,1,1,13,13 4:1,1 5:1,1 7:6 7:6 15:16 340:8 353:1 354:1,1 355:1 355:1 table 132:3,10 133:12,17 158:13,13 159:3 189:11 191:11 199:22 236:7,8 242:4 242:22 249:6,8 252:24 255:22 259:25 260:6 260:11,18 261:12,19,24 262:10 263:17 265:24 302:8 302:12 315:11 330:5,8,10 337:17</p>			

321:5,11,19,22 338:15,21,22 340:21,25 341:10,21 343:1 target 256:1 targeting 23:18 taught 47:12 47:15 50:5,12 184:17,23 tce 61:18 89:21 89:25 141:3 206:16,22 218:16,25 219:12,13 220:16,19 221:4 222:1,3 223:23 249:5 249:11,14,18 250:6,21 251:16,24,25 252:11,14,17 252:22 253:13 253:21 254:11 308:23 309:13 309:24 318:22 teach 38:16,18 38:19,24,24 39:3,10,13 41:8 50:13 184:10,15,17 184:18,19 185:1	teacher 79:9 224:2,8 teaching 39:13 41:9 79:6 114:5 185:4 team 39:12 tech 4:11 174:1 technical 276:19 277:18 281:23 technologies 43:20 technology 43:25 44:15 45:3 47:6 telan 15:16 tell 8:15 66:14 86:24 157:10 245:23 256:11 256:19 304:19 341:8 342:11 346:24 349:8 tells 164:4 329:21 339:12 temperature 82:12 85:7,12 121:15 319:5 temperatures 319:8,9 tempted 114:4 227:3 ten 42:13 203:7 203:16 204:3 205:18 291:2	292:9 293:11 tension 183:12 term 124:5 129:6 131:17 137:11,14 139:6 140:6,10 150:6 167:18 167:20 205:4 265:17 276:18 276:19 282:23 terminology 71:2 170:21 172:7 242:24 261:6,14 263:5 265:12 terms 39:23 48:5 98:24 129:16 141:12 172:7 187:16 192:19 194:13 205:2 286:13 327:16 333:22 340:16 341:9 342:12 terrace 22:16 55:19 77:9,13 98:7 235:9 248:10 255:8 255:11,25 257:11 258:8,9 258:19 259:17 260:19 261:13 261:19,25 262:17,25	263:18,25 264:1,25 265:24 320:21 321:5,12,20,22 338:15,21,22 341:1,11,21 343:2 test 41:16 244:8 347:8 testified 12:5 124:13 316:2 348:10 testify 355:7 testifying 8:8 9:20 testimony 4:21 9:16 10:9 105:4,24 245:15 305:16 305:17,22 322:5,24 323:21 324:1 353:9 355:10 tests 41:14 tetrachloroet... 255:23 340:21 340:25 text 14:18 145:7,13 161:3 161:8 257:2 286:2,7,19 295:2 297:13 textbooks 268:5
---	---	---	---

thailand 36:4	55:1,2,20 72:8	204:6,16,20	110:6,15,15,16
thank 16:23	74:10 81:23	329:16,17,20	110:19 111:1
17:1 22:2 25:1	96:1 99:16	329:24	112:23 113:18
25:8 56:2	100:2 123:10	thorough 158:6	113:25 114:2
58:12 73:15	130:18 134:19	thought 50:22	114:16,20,21
95:8,16,19	139:10 144:9	170:13 233:17	114:22,24,25
141:1 151:2	146:10 154:11	296:14 315:22	120:2,22 121:7
157:4,6 158:21	155:15 170:7	340:16 341:9	121:11 122:15
177:4,5 185:14	177:25 204:23	346:21	122:17,20,21
188:22 205:13	207:6 241:1	thoughts	135:6 154:12
225:13,14	251:2 256:14	157:17	155:10 156:3
233:9 259:14	259:23 274:20	three 11:18	174:13 175:20
324:4,6 336:17	278:20 283:23	22:6 25:16	181:21,24
336:22 338:16	288:9 313:24	49:18 57:2	183:12 196:4
347:12 352:2,4	318:12 325:19	156:18,20	206:1,10 216:2
theoretically	326:5 330:13	159:10,11	221:23,25
152:3	337:2 338:15	184:21 201:20	222:2,4 223:1
thesis 37:22	348:18,19,21	202:10,24	225:10 248:2
thing 34:5	thinking 59:5	203:6 248:18	248:16 250:1
112:2 118:6	211:1 347:4	252:7 259:23	253:12,20
173:5 175:7	348:19	289:12 299:23	254:11 255:1
217:3 233:3	third 187:1	300:17 352:13	260:22 269:7
263:7 273:25	252:12 289:6	time 8:11,12	271:24 273:21
331:10	thirty 212:8	11:14 12:8	274:15 276:6,9
things 245:16	thomas 4:13	14:6 17:16,21	277:5 299:21
272:8 287:18	169:24 170:16	23:14 24:23	300:4 303:16
313:14 315:9	171:15 180:19	38:4 49:14,20	303:18 305:4
344:21 350:14	181:1,21	49:24 51:25	309:18 310:18
think 6:13 8:13	182:14 186:10	54:6 63:9	317:21 318:6
12:23 17:13	186:14,18	69:22 71:17	318:13,14
18:3,15 23:19	189:8 190:18	73:19 81:8,10	321:2 323:17
25:20 35:2,4	198:16,19	81:18,20,25	324:5 325:10
35:15 40:11	199:3,6,21	86:10,22 87:4	329:2,7,8
42:23 50:17	202:8 203:4	95:21 103:19	333:1,12 346:3

352:2 353:10 time's 324:8 timeframe 77:20 82:5 181:9 221:18 221:20 325:14 327:3 times 7:11 25:14,16 107:16 124:15 181:3 190:16 202:11,11,25 203:7,7 207:6 211:21 248:13 248:14 252:7 265:10 272:13 291:2,20,24 292:9 293:11 351:13,21 tinker 47:11 tiny 306:19 tips 4:11 174:1 title 27:10 28:15 155:14 340:10 today 8:15 9:20 9:23 10:10,13 11:3,12 28:4,7 29:9 31:3,5 53:23 61:16 74:17,20 75:20 77:6 78:21 101:6 143:24 153:25 179:10	184:15 186:18 193:7 212:25 213:11 217:9 223:6 265:23 267:21 306:13 309:21 313:15 321:10,11 323:7,19 324:5 325:16 328:25 346:8,21 352:3 today's 6:2 together 40:3 told 68:2 179:10 198:19 340:16 ton 117:17 took 76:7,10 104:20 179:18 185:23 186:3 199:15 205:14 231:23,24 299:22 331:16 344:16 345:6,9 top 66:24 106:14,24 107:13 111:15 115:3 117:25 168:21 169:5 174:10,19 181:14,16 194:4 195:9 196:23 198:22 214:17 223:14 254:1 258:12	278:21,22 280:1,2 288:10 296:19 308:16 346:1 topic 38:3 topics 78:24 227:13 tour 74:25 toward 24:3 towards 24:4 168:21 199:25 tower 66:13 100:20,25 113:19 114:11 115:4,24 179:3 179:7 towers 66:23 68:9 94:23 112:19,21,25 115:21 120:17 171:19 172:1 177:10 283:19 344:18 toxicologist 129:9,11 toxicologists 234:1 traced 250:5 tracer 243:21 243:22,24 244:6,11,14,17 244:19,20,22 244:25 245:1,2 245:19 246:6	249:23 252:4 tracers 243:23 244:2 track 296:25 tracking 296:25 tracks 8:1 trade 39:13 trailer 117:15 117:16 118:2 279:23 280:4 training 48:13 48:15,18,24 273:9 transcribed 355:9 transcript 4:17 9:16 269:20,25 270:9 271:7 352:9,9 355:10 transcription 353:9 transcripts 271:16 transfer 87:20 89:3 90:5,6 187:15,16 188:14,17 189:2,4 194:1 277:4 transitioned 24:3 273:21 299:8
---	---	--	---

transitioning	321:6,13,21	217:22,23	trip 20:4,6,7,8
298:21	339:2 340:15	226:10,15	20:9,16,23
translate	341:10,13,21	228:16,23	21:8 75:17
273:19	342:4,13,21	229:23 230:2	trips 211:24
translated	345:19 346:4	230:16 231:8	true 78:1 192:4
306:8	treatment 51:3	234:4 235:13	353:8 355:10
transport	56:5 60:4,12	235:22 239:18	trusted 150:7
37:20 51:10,17	62:21 65:7,10	240:1,3,20	truth 8:15
transportation	65:20 66:7	242:6 243:6,12	157:10 346:25
37:15	72:14 74:25	243:16 244:3,8	355:7
transported	77:7,12,17	244:9,12,15,15	truthful 10:9
187:4	78:2,9,13 91:8	244:22,24	try 7:23 53:15
transposed	92:5,22 93:13	245:9,14,19	73:13 153:24
158:18	98:7,25,25	246:22 247:4	154:7 173:14
travel 305:5	99:14,21 100:6	247:13,16	338:17
traveling	100:15 102:12	248:10,21	trying 13:13
198:24	103:23 107:14	250:1,7,24	25:20 26:4
treat 338:23	108:1 109:12	251:3,17,18	32:21 34:6
treated 56:22	122:23 123:4	253:2,13,21	64:14 86:18
57:7 94:18	125:12 126:8	254:12 255:14	154:6 167:16
195:21 234:5	128:18 133:24	255:25 256:16	172:22 176:1
235:9 236:10	133:25 134:2	257:6,11,19	220:18 227:10
239:15 240:9	138:4 150:16	258:3 259:3,5	232:14 238:23
240:17 243:5	151:6 171:18	260:19 262:19	245:4,6,18,20
243:11 244:23	171:25 172:13	264:3 266:14	273:19 296:25
247:15 249:13	172:18,25	272:23 283:18	317:1
249:17 250:8	184:6,8,11,14	283:20 284:7	tub 313:18,22
250:21 251:25	185:5,9 195:14	321:23 328:15	314:10,21
253:6 255:12	195:16,19	329:10 331:16	turbine 167:13
256:12 257:5	196:20 197:7	332:13 333:24	turbulence
257:10,22	198:25 205:7	335:2,7 336:9	182:24 183:4,9
262:17,24	205:11 212:1,3	338:12 344:15	194:3,7 197:1
263:17,25	212:5 215:15	347:24 348:2	208:20 276:13
289:18 320:22	216:12,15		276:16

<p>turbulent 194:11 195:1 196:25 276:17 turn 22:3 23:2 30:20 34:20 50:16,25 59:12 100:11 104:16 106:5,16 107:2 108:3 117:13 117:22 123:6 124:24 128:7 138:16 150:11 158:12 161:2 168:1 170:22 186:24 189:8 200:13 215:19 229:17 230:6 235:2 236:1 241:22 250:16 255:17 260:7 261:2,10 266:4 266:17 267:15 277:8,12 281:15 282:10 282:24 285:22 286:15 291:8 291:23 292:14 293:1,19 294:23 298:14 300:11 304:21 307:8 324:25 325:4 330:5 331:12 332:21 332:23 333:17</p>	<p>337:12,15 339:10 340:12 344:4 turnaround 352:14 turned 247:5 turning 120:15 120:15 123:8 140:11,22 158:11 159:19 162:12 166:6 169:22 189:7 205:21 208:3 227:20 228:18 249:5 255:8,19 271:19 279:10 288:8 294:17 297:22 302:6 303:20 306:1 twenty 45:22 212:9 twice 270:17 two 7:17 11:18 11:19 15:1 25:16 39:11,13 87:20 89:3 90:7 98:11 106:7 117:17 159:10 164:8 187:15 188:13 189:2 191:12 212:6 243:3,9 247:13 248:19 249:16 256:24</p>	<p>260:2 291:9 299:22 304:23 315:8,20 type 43:24 107:13 138:12 152:17 153:9 219:10 245:3 283:11 324:3 typically 97:22 121:17 245:18 typo 133:11</p> <hr/> <p style="text-align: center;">u</p> <hr/> <p>u 5:1 353:1 uh 21:22 53:19 55:4 87:10 90:2 115:10,14 144:14,25 145:18 148:3 148:24 152:6 152:23 199:20 200:23 257:1 264:19 271:9 277:14 278:8 283:1 292:7,20 293:21 297:8 315:12 318:9 344:6 ultimate 51:5 122:21 329:1,7 ultimately 84:14,15 245:18</p>	<p>um 288:3 un 288:2 unable 10:8 unaware 52:6 uncertainty 233:1 unclear 116:16 uncomfortable 221:11 under 89:14 95:17,18 125:4 140:4 148:15 157:10 177:12 186:3 208:25 209:13 243:18 245:7 322:21 330:22 335:13 344:5 353:6 undergoes 138:22 underline 128:21 underlying 101:12 understand 7:19 8:14 9:18 10:1 13:14 48:9 61:20 67:9 81:23 86:23 95:17 105:15 123:12 124:1 146:11 157:9 162:20 179:9 185:10</p>
--	---	---	--

<p>196:13 225:15 238:24 263:6 267:16 272:20 272:25 277:19 316:12 322:25 349:18</p> <p>understanding 12:24 13:8,16 13:22 18:8 29:15,17 48:8 68:11 91:18 93:17,19 97:17 99:5 104:1 105:1 126:21 127:7,9 143:25 144:8 150:19 150:22 151:9 161:15,19 164:25 165:4 178:18 179:11 207:4 218:9 223:18 236:24 237:4 242:21 260:25 273:12 282:7,8 316:3 319:15 339:24</p> <p>understands 16:19</p> <p>understood 9:19,25 10:4 95:19 96:1 143:11 166:2 265:14 322:14 322:21</p>	<p>underwent 297:15</p> <p>undulations 193:25</p> <p>unfilled 157:21</p> <p>unhindered 288:2</p> <p>uniform 85:7 85:10 90:20</p> <p>unique 242:7</p> <p>uniquely 51:2</p> <p>unit 4:10,11 99:21 208:15</p> <p>united 1:1,12 5:6 6:9 8:14 14:5 19:20 39:20</p> <p>units 288:11</p> <p>university 7:13 36:3,4,25 37:7 38:8,23 41:7 44:5 45:6 65:23</p> <p>unknown 333:1</p> <p>unloading 280:7</p> <p>untreated 249:11,18 250:21 251:24 254:25 255:5 256:5 257:23 258:7 343:1 345:19 346:4</p>	<p>update 29:16</p> <p>updated 35:18 52:25</p> <p>updating 100:3 100:4</p> <p>upfront 343:16</p> <p>ups 350:1</p> <p>upstream 256:15,22 257:16,20</p> <p>upwards 187:12,25 188:7</p> <p>usa 104:7 116:20</p> <p>usdoj.gov 2:9 2:12</p> <p>use 56:22 60:18 61:12 62:3 79:7,9 82:9 139:7 149:22 149:25 151:22 152:2 153:3 154:1 167:18 167:19 169:23 170:15 189:16 191:1 193:4 197:21 198:19 199:8 205:22 206:3 231:8,17 232:21 239:15 239:25 240:12 240:17 241:10 245:2 263:25</p>	<p>276:15 277:20 287:24 295:6 295:12,17 302:11 315:15 323:8,10 330:2</p> <p>used 57:7 64:10 116:9 121:8 133:16,19 137:11 141:5 142:18 143:17 148:18 157:15 159:3 165:3 169:25 170:2,3 170:17 171:7 190:10 194:13 199:13,18,23 200:6 206:23 209:19 210:2 211:2 215:5 233:25 234:5,7 234:12,13,14 235:10,18 236:10 237:1 242:8,22 256:24 260:13 260:18 261:12 261:19,24 262:11,18,24 263:18 265:1 265:17,19,23 266:3 275:2 281:22 286:21 289:25 302:20 303:2,4 309:7</p>
--	--	---	---

<p>316:4 318:21 319:2 329:11 329:13,24 330:17 331:1 333:12 350:11 uses 79:3 using 35:7 159:15 205:3,3 256:21 261:7 263:12 265:11 274:14 281:11 287:3 300:24 321:13,20 328:6 usmcgen 3:15 usually 187:3 utilities 62:20 63:3</p>	<p>320:8 321:16 valuable 148:13 323:6 value 48:5,6 133:4,13 134:16 147:22 148:1 191:1 198:3 199:13 199:23,24,24 199:25 200:4 200:11 201:17 241:2,6 260:3 330:23 values 134:17 142:1 190:19 190:23 191:11 200:19 201:18 202:3,22 231:8 234:5 235:18 253:1 327:9 valves 328:17 variations 99:2 varied 178:2 347:21 varies 108:2 varying 30:12 31:10,11 vast 155:1 velocities 195:5 306:3 velocity 195:25 196:2,4,5,7,11 196:16,17,19 196:24 197:10</p>	<p>198:1,12,23 317:19 318:4 318:15 vent 70:7,16,19 71:11,17,23 80:6,7,15 81:1 81:19 106:21 106:23 107:8 107:12,25 108:6,18,24,25 109:3,12 111:16 118:6,9 119:3,5,9,16,18 120:7,13 176:10,13,20 328:2,7 vented 67:4,10 69:2,13,18 70:1 104:3 109:22 110:2,9 111:9,17,22 112:12,19,25 113:19 114:11 115:3 119:10 180:23 199:16 205:16 ventilation 68:23 176:22 venting 70:10 119:4 172:2 vents 106:7,12 106:13,23 110:23 111:4 116:9,11,14,15</p>	<p>118:20 119:2 119:23 172:10 172:14 328:14 verbally 8:19 verification 260:25 261:1 261:16 262:6 263:10 verify 239:11 version 117:4 277:21 versions 288:25 289:24 290:3,3 versus 64:17 88:13 141:15 145:3 149:17 158:19 163:16 172:9 196:25 226:1 236:7 242:3 263:5 vertical 187:2 306:14 vessel 328:18 vessels 67:5 video 1:10 310:23 311:2,5 videographer 2:19 6:1,15 95:9,12 154:17 154:20 185:16 185:19 241:13 241:16 302:1,4 324:9 347:14 347:17 352:5</p>
<p>v</p>			
<p>v 4:1 validate 320:19 343:3 validated 320:1 320:16 validation 234:11,17 242:25 260:24 261:4,15 262:5 262:12 263:5,7 263:12,13 265:4,8,15,18 265:19,20,25 319:14,16</p>			

<p>videotaped 6:2 view 197:16 200:15 viewed 197:17 viewing 100:5 305:17 virtually 274:18,19 virtue 48:7 231:7 vision 97:11 visit 74:1,8,18 74:20 75:3,8 75:11,14,20 76:7,14,19 77:1 211:25 305:11,18,20 322:4,6,9 327:5 visited 65:11 visiting 47:9 visits 73:7 332:12 344:10 visual 144:8 147:9,10,13 148:11 166:1,5 visually 144:15 146:13 147:4 168:20 212:19 212:20 vitae 34:23 35:1 vo 139:23</p>	<p>voc 56:4,15 60:1,4,11,17 81:5 93:20 94:2,23 120:24 125:11 126:8 128:13 129:3 129:15,24 130:8 134:7 135:14 138:20 139:2,25 140:16 141:10 142:1 166:19 208:5,10,15 209:1,14,18,20 210:1,3 211:12 215:23,24 216:6,7 222:17 222:23 228:15 228:22 230:2 230:15 232:11 232:11 235:21 239:17 240:2 240:11,19 245:6 249:1 250:2 257:7,10 264:2,21 276:25 314:21 321:23 343:21 vocs 61:17 77:18 78:15 94:17 110:2,3 110:8,10 112:24 113:1 113:19,20</p>	<p>115:15 122:10 122:12,23 123:4 131:25 132:24 134:20 135:11 187:11 187:25 188:7 205:23 206:4 209:6 215:6 222:19,20 224:5,24 225:1 225:8,16 229:22 246:4 246:21 247:3 247:12 248:3 248:20 251:3 257:17 329:2 329:18 voice 176:24 volatile 246:1 303:12 volatilization 4:12 70:8 79:7 85:25 86:6,12 87:7,16 88:5 89:10,15 90:11 126:20 148:4 155:8,21 166:19 180:22 181:1 186:11 186:14 188:6 190:12 200:17 200:19 201:18 202:3,15,22 203:15 204:2</p>	<p>205:17 206:10 229:22 277:5 303:16 305:5 308:23 309:13 309:24 310:8 311:10,19,22 317:21 318:6 318:14 319:4 328:9,20,23 329:15 330:3 333:23 343:4,5 344:14 345:8 volatilize 187:11 volume 84:6,6 135:22 196:3 288:1 325:5,9 vortex 148:22 161:9 162:7 163:11 164:10 164:17,20</p>
w			
<p>wait 9:9 17:16 20:10 48:21,21 54:11 58:24 73:13 114:14 159:8 171:2,2 171:2 183:23 183:23 224:6,6 want 16:24 27:19,22,23 48:22 55:1 63:25 64:5</p>			

74:18,20,22,23	57:20,21 60:5	96:3,7,14,17,20	133:24,24,25
75:8,11 78:25	60:12,18 61:9	96:21,22 97:7	134:1,21 135:3
123:6 146:16	61:12 62:19,21	97:12,17,24	135:12 136:20
146:19 154:22	63:3 64:12,15	98:7 99:2,6,6	138:4,4,22
156:6 193:12	64:17,18 65:7	99:14 100:6,15	141:14 142:18
215:19 227:14	65:10,20 66:13	100:19,20,25	144:6 145:16
227:18 233:3,4	66:13,19,22,22	102:12 103:14	145:23,23
233:18,20	67:24,25 68:1	103:17,18,23	148:1,2,7,13
247:25 266:4	68:9,15,21,24	103:24,24	149:10 150:16
266:17 277:8	69:2,8,10 70:9	106:14,25	151:6 157:15
306:11 324:25	70:13,25 71:3	107:13,25	158:3 160:2
325:5 331:3	71:14,16,19,22	109:12,22	161:16,21,23
333:17,20	71:24 72:14,18	110:2,2,9,9,23	162:5,8 163:13
336:23 337:1	72:21 73:3,5	111:10,17,22	163:14,17,21
339:10 343:11	73:12,21 74:25	112:12,19,21	164:1,5 165:11
352:12	77:7,12,16,17	112:24,25	165:16,19,20
wanted 49:8	78:2,9,13,13	113:19,19	166:14,15
64:16 78:10	82:19,20,24	114:11 115:3	167:5,13,16,23
233:11 289:20	83:1,6,7,14,15	115:12,16,18	168:9,15 169:7
349:18	83:25,25 84:3	115:21,21,24	171:18,18,19
wants 113:15	84:6,9,22 85:2	116:8 117:8,11	171:24,25
warmer 82:20	85:11,13,16,17	117:16 118:1	172:1,3,4,6,12
83:1,6,14	86:1,2,7,8,13	118:17,19	172:25 173:7
washington 2:9	86:15,16 87:7	119:1,6,10,22	174:1,10 176:2
watched	87:8,9,17,18,24	120:4,15,16,16	176:10,14,21
310:23 311:2	87:25 88:6,7	120:17,22	177:3,10,15,24
watching 247:1	88:20 89:10,15	121:7,12,18	178:1,4 179:3
water 1:4 4:11	89:21,25 90:11	122:11,22,23	179:7,12,19
4:12 7:25 14:1	90:24 91:4,8	123:3,4 125:12	181:4,12,13
32:8 38:20	91:19,23 92:4	126:8,22 127:5	182:2,3,11,22
39:18 51:3,5	92:5,12,13,15	127:16,20	182:24 183:5
52:1,5,9,25	92:22 93:2,6	128:1,4,18	183:15,16
56:5,7,8,17,18	93:10,13,13,15	130:2 133:20	184:8,11,13
56:23 57:7,12	93:18 94:18,23	133:21,23,24	185:5,9,22

186:14 187:3	243:5,9,10,11	277:21 278:2	313:1,20 314:8
187:10,12,19	244:3,7,8,12,15	278:12 279:4	315:3,4,9,15,22
187:22,24	244:20,21,21	279:23 280:4,7	316:3,23 317:2
191:4,8,15,16	244:23 245:19	280:12,19,21	317:11,14,17
191:21 192:1,2	246:22 247:3	281:5,23 282:3	318:19,21
192:3,7,12,19	247:13,14,15	283:13,14,18	319:6,6 320:22
192:20,23	248:10,21	283:19,20,21	321:6,13,21,23
193:8,9,20	249:11,13,17	283:21 284:3,6	323:4 328:4,7
194:16,17,17	249:18 250:1,6	284:7,8,10,12	328:9,15,15,16
195:7,14,16,19	250:8,23 251:2	284:16,18,19	328:17,22
195:21,22,24	251:16,18,24	284:21 285:7,8	329:2,9,16,18
195:25 196:2,2	251:25 253:1,7	286:11,22,23	331:15 332:12
196:9,10,20,20	253:13,21	287:2 288:1,24	333:24 334:1,5
197:7 198:13	254:12,24	289:7,15,18	334:25 335:2,6
198:24,24	255:4,12,13,24	290:4,13,19	335:7 336:9,11
199:16 204:25	255:25 256:6	291:21 292:9	338:12,23,24
205:4,7,8,10,11	256:13,16	292:10 293:11	339:2,3 344:5
205:11,15,15	257:4,5,6,10,11	293:16 294:4,5	344:8,14,17,18
206:15,17	257:17,17,18	295:13,18,22	345:18 347:23
211:25 212:3,5	257:22,22,22	295:23 296:3,4	354:2
212:17 215:12	257:24 258:3,6	296:4 297:24	water's 71:7
215:15 216:11	258:7 259:3,5	298:1,10,16	121:8 163:24
216:14 217:22	260:19 262:17	299:23 300:19	watermodeling
217:23 218:1,2	262:24 263:17	301:8,16 302:8	101:21
218:7 225:8,16	263:25 264:3	303:3,22,25	waves 193:25
226:3,4,5,10,15	266:5,14,14,19	304:7,14 305:7	194:15,19
228:16,23	267:17 269:7	305:8,11,18	195:9
229:23 230:2	271:23 272:15	306:8,15,19,24	way 7:22 8:1
232:6,12 234:5	272:23 273:10	307:2 308:12	19:10 31:20
235:9 236:10	273:12,20,20	308:17,19	44:18 70:14
237:6,15	274:14,17	309:23 310:6	71:10,14,15
239:15,17,25	275:1,5,8,23	310:11,23	105:20 109:2
240:1,2,9,17,19	276:2,5,13,21	311:2,6,21	119:8 121:7
242:6 243:3,4	276:24 277:18	312:16,19	130:21 153:13

162:21 174:6	wells 78:12	25:8 26:14,19	94:8,20,25
176:9,16,18,19	102:6 135:2,12	27:3,7,25	95:24 96:11,19
190:4 209:16	136:20 247:4	28:12 29:22	96:25 97:11,20
210:6,8 217:10	248:14,15	30:8,18 32:20	98:2,10,15,22
223:7 225:5	253:14,22	33:2 34:5,16	99:10 100:13
233:7 292:10	254:12 259:23	34:19 36:16	101:2,15,18
293:16 304:20	345:21,23,24	40:16,21 41:3	102:15,23
306:16,17	346:2,3 347:20	48:23 50:3	103:12,22
308:17 312:6	350:22,24	51:15,21,24	104:5,14,22
315:18 316:20	351:12	52:19 53:14	106:11,20
317:7 328:22	went 29:12	54:2,7,13	107:16 108:5
ways 167:23	44:1 75:17	55:24 56:11,21	108:10,15
319:7,12	146:5 149:2	57:6,25 58:6	109:5,16,20,25
we've 58:2	161:12 162:15	59:3,13 60:8	110:25 112:16
104:23 123:10	172:6 180:5	60:15,21 61:8	113:4,17,24
182:8 206:14	186:6 314:18	61:15 65:17	114:4,19 115:7
252:17 289:2	wheel 117:17	68:17,23 69:5	116:1,13,24
301:22	whoops 291:9	69:16,20 70:4	117:24 118:23
week 7:11	292:15	70:22 72:5	119:14 120:1,9
115:22	wide 152:18	73:15,18 74:4	121:3,24
weeks 114:12	widespread	74:15 75:7,22	122:14,19
254:4	97:5	76:16,22 77:22	125:1,18
weir 10:22	willing 146:21	77:25 78:18	126:13,19
141:15 142:6	withdraw	80:13,19 81:16	127:2,15
weitz 2:4	111:7 252:10	82:8,23 83:4	128:11 129:6
weitzlux.com	341:2	83:11,18 84:14	129:21 130:2
2:6	witness 6:16	84:20 85:4,20	130:16 131:13
welcome 32:13	12:8 13:3,11	86:4,10,18,22	132:13,19
33:7 95:14	13:24 15:24	86:25 87:20	133:3,23
140:24 157:2	16:15,17 17:14	88:2,10,18,23	134:11,23
190:14 203:19	17:20,22,25	89:18,25 90:15	135:6,17,25
256:4 270:19	18:24 19:8	91:2,7 92:1,7	136:14,24
271:3	20:18 23:4	92:18 93:4,8	137:7 138:13
	24:20,23 25:1	93:12,24 94:5	138:18 139:5

140:4,20	222:19 223:1	292:21 293:22	word 128:21
141:12 143:1	224:1,7,23	294:8,24	139:7 238:16
143:22 144:4	225:20 226:22	299:11 300:16	276:16 350:11
144:20 146:23	227:3,9,16	301:19,25	wording
147:8 149:15	228:7,9,18,25	304:9 305:25	162:20
150:4 151:1,3	229:16,19	307:5,10 308:4	words 155:22
151:16 153:16	230:8 231:6,15	309:4,17 310:2	247:11
153:22 154:4	231:22 232:10	310:13 311:15	work 7:8,16,18
159:10 160:4	232:19 233:1	313:24 314:12	8:7,8,21 23:11
160:10,18,23	233:17,24	314:24 319:1	23:12,15,20
162:10 163:7	234:25 235:6	319:18 320:4	36:20,22 40:25
164:19 165:14	235:25 236:3	320:12 321:1	44:3 47:2,8
168:3 169:9,19	236:20 237:10	322:1,19	61:25 73:9
170:8,11,20,24	237:22 238:6	323:12 324:7	119:22 130:4
171:3,5 174:16	239:1,20 240:6	325:3 326:14	207:12,14
175:1 177:4,12	240:24 242:1	330:7,14	214:3,18
180:19 181:7	243:2,14,18	331:14 332:2	239:13 267:14
182:14 183:25	247:8,19	332:18,24	273:18 313:25
186:25 188:3	248:12 250:12	333:19 335:12	319:20 320:18
188:10 189:10	250:19 251:20	337:14 338:4	333:9 343:17
189:18 191:18	253:5,17,25	340:5,8,20	351:4,6
191:23 192:10	254:7,16,21	341:24 343:15	worked 15:11
192:16 193:18	258:12,21	345:15 346:6	15:18 16:6
194:6 195:24	259:13,21	346:23 347:2	18:15,24 26:2
200:14 201:1,9	260:8 262:4	348:24 351:9	43:3,6 57:22
202:14 203:10	263:4,9,22	351:17,23	64:7
204:5 206:1	264:10,18	352:4 353:17	working 13:19
209:9,23 210:5	265:4,11,17	355:11,16	15:22 49:6
210:13 211:15	266:2,11 267:5	witnessed	245:16 274:24
213:18,25	268:3 270:3,13	291:20	312:4
215:11 216:17	272:5 273:15	wondering	works 79:4
217:13 218:11	277:15 278:24	102:19 133:6	worth 32:4
218:19 219:4	285:23 287:23	198:23 238:10	write 26:23
220:6 221:7	289:17 290:11	314:5	49:17 63:7,9

262:7 267:13 writing 49:1,11 written 27:15 42:6 286:3 wrong 21:14 166:4 200:24 296:8 339:22 wrote 67:2 72:12,17 131:7 339:12 wtp 151:6	212:9 213:22 218:19 220:1 228:7 230:6 235:11,14 239:23 240:24 247:8 252:16 256:19 260:22 278:11 279:14 280:2,24 281:3 285:10 291:17 292:16 296:11 297:4 301:5,11 307:5 308:7 314:15 322:19 331:2 332:9 337:2 342:17 346:23 347:12 349:2,7 350:12 year 17:7 18:4 24:2,4 123:19 155:4 185:2,2 185:3 345:3 years 7:15,19 12:23 15:1 26:5 42:13,14 45:22,22 79:11 184:21 yep 78:11 135:10 152:8 161:7 278:10 284:25 285:2 yesterday 11:13,17,23	york 2:5,5 youtube 310:23 311:2
x		z
x 3:13 4:1		z 340:8 zero 178:2 206:25 zina 2:17 zoom 2:3,13 23:6 24:13 25:6,11 275:14
y		
yeah 17:14,18 32:20 33:9,23 40:21 43:16 44:9 47:24 61:8 65:17,17 72:2 77:22 86:25 91:7 106:19 107:7 111:19 120:21 124:12 128:9 131:21 133:9 137:7 141:22 150:13 156:15 157:8 160:18 162:20 170:20 171:1 175:15 175:17,20 176:21 177:23 179:1,4 188:22		

Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate.

The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

THE ABOVE RULES ARE CURRENT AS OF APRIL 1, 2019. PLEASE REFER TO THE APPLICABLE FEDERAL RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

VERITEXT LEGAL SOLUTIONS

COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted

fashion to authenticated parties who are permitted to access the material. Our data is hosted in a Tier 4 SSAE 16 certified facility.

Veritext Legal Solutions complies with all federal and State regulations with respect to the provision of court reporting services, and maintains its neutrality and independence regardless of relationship or the financial outcome of any litigation. Veritext requires adherence to the foregoing professional and ethical standards from all of its subcontractors in their independent contractor agreements.

Inquiries about Veritext Legal Solutions' confidentiality and security policies and practices should be directed to Veritext's Client Services Associates indicated on the cover of this document or at www.veritext.com.