

HEARING EXHIBIT SBUA-04

A.25-06-017

Attachments to Q14

Depositions Provided as Exhibits to Answer to Question 14

Deposition Transcript

Case Number: JCCP No. 5228

Date: February 19, 2024

In the matter of:

MOUNTAIN VIEW FIRE CASES

GARY FOWLER

**CERTIFIED
COPY**

Reported by:

Cheryl S. Ortega
CSR No. 13709

Steno

Official Reporters

315 W 9th St.
Suite 807

Los Angeles, CA 90015
concierge@steno.com

(310) 573-8380

NV: FIRM #108F



- 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

SUPERIOR COURT OF THE STATE OF CALIFORNIA
COUNTY OF LOS ANGELES - SPRING STREET COURTHOUSE

COORDINATION PROCEEDING SPECIAL)
TITLE (RULE 3.550),)
)
)
MOUNTAIN VIEW CASES) NO. JCCP NO. 5228
)
)
)

REMOTE VIDEO-RECORDED DEPOSITION OF
GARY FOWLER
FEBRUARY 19, 2024

REPORTED BY: CHERYL S. ORTEGA, CSR NO. 13709
STENO

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

SUPERIOR COURT OF THE STATE OF CALIFORNIA
COUNTY OF LOS ANGELES - SPRING STREET COURTHOUSE

COORDINATION PROCEEDING SPECIAL)
TITLE (RULE 3.550),)
)
)
MOUNTAIN VIEW CASES) NO. JCCP NO. 5228
)
)
)

REMOTE VIDEO-RECORDED DEPOSITION OF GARY FOWLER,
TAKEN BEFORE CHERYL S. ORTEGA, CSR NO. 13709, A CERTIFIED
COURT REPORTER FOR THE STATE OF CALIFORNIA, COMMENCING AT
9:25 A.M., MONDAY, FEBRUARY 19, 2024.

STENO

For subrogation plaintiffs:

Cozen O'Connor

By: David D. Brisco, Esq.

Dana Meyers, Esq.

Howard Maycon, Esq.

501 West Broadway, Suite 1610

San Diego, California 92101

619.234.1700

Dbrisco@cozen.com

Dmeyers@cozen.com

HMaycon@cozen.com

Bauman Loewe Witt & Maxwell, PLLC

By: Paul T. Landis, Esq.

8765 East Bell Road, Suite 210

Scottsdale, Arizona 85260

480.502.4664

Plandis@blwmlawfirm.com

Schroeder Loscutoff Stevens, LLP

By: William M. Loscutoff, Esq.

Eric Schroeder, Esq.

Amanda Stevens, Esq.

7410 Greenhaven Drive, Suite 200

Sacramento, California 95831

916.438.8300

Wloscutoff@calsubro.com

Eschroeder@calsubro.com

Astevens@calsubro.com

Grotefeld Hoffman, LLP

By: Lilla Shkolnikov, Esq.

Margaret Sell, Esq.

700 Larkspur Landing Circle, Suite 280

Larkspur, California 94939

415.344.9670

Lshkolnikov@ghlaw-llp.com

Msell@ghlaw-llp.com

Berger Kahn

By: Craig Simon, Esq.

1 Park Plaza, Suite 340

Irvine, California 92614

949.474.1880

Csimon@bergerkahn.com

STENO

1 Jang and Associates, LLP
2 By: Stephanie Yee, Esq.
3 2121 North California Boulevard, Suite 290
4 Walnut Creek, California 94596
5 925.937.1400
6 Syee@janglit.com

5 Denenberg Tuffley, PLLC
6 By: Erik Schmitt, Esq.
7 28411 Northwestern Highway, Suite 600
8 Southfield, MI 48034
9 248.549.3900
10 Eschmitt@dt-law.com

9 FOR PUBLIC ENTITY PLAINTIFFS:

10 Baron and Budd
11 By: Jason Julius
12 11440 West Bernardo Court, Suite 265
13 San Diego, California 92127
14 Jjulius@baronbudd.com

13 FOR INDIVIDUAL PLAINTIFFS:
14

15 Fox Law APC
16 By: Russ Gold, Esq.
17 201 Lomas Santa Fe Drive, Suite 420
18 Solana Beach, California 92075
19 858.256.7616
20 Russ@foxlawapc.com

18 Singleton Schreiber Mckenzie and Scott, LLP
19 By: John Cadieux, Esq.
20 591 Camino De La Reina, Suite 1025
21 San Diego, California 92108
22 619.837.2139
23 Jcadieux@singletonschreiber.com

22 Law Offices of Shawn E. Caine, APC
23 By: Jessica Kirshner, Esq.
24 1221 Camino Del Mar
25 Del Mar, California 92014
858.350.1660
Jkirshner@cainelaw.com

STENO

1 Robertson and Associates
2 By: Alex Robertson
3 32121 Lindera Canyon, Suite 200
4 Westlake Village, California 91361
5 818.851.3852
6 Arobertson@arobertson.com

7 FOR DEFENDANTS LIBERTY UTILITIES (CALPECO ELECTRIC)
8 LLC AND LIBERTY UTILITIES CO.:

9 Haight Brown and Bonesteel, LLP
10 By: Krsto Mijanovic, Esq.
11 555 South Flower Street
12 45th Floor
13 Los Angeles, California 90071
14 213.542.8000
15 Kmijanovic@hbblaw.com

16

17

18 Also Present:

19 Greg Buhlert, Videographer
20 Greg McCullough, assistant, Berger Kahn
21 Evan Krell, assistant, Berger Kahn

22

23

24

25

STENO

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

INDEX

PAGE

EXAMINATION BY MR. BRISCO 10

EXHIBITS

PAGE

034-0001	NOTICE OF DEPOSITION	11
034-0002	EXPERT WITNESS DESIGNATION	15
034-0003	LIST OF OPINIONS	16
034-0004	LIST OF PRIOR DEPOSITION AND TRIAL TESTIMONY	17
034-0005	DOCUMENT, SPAN DIMENSIONS	38
034-0006	PHOTOGRAPH OVERALL VIEW OF ARC TICK	45
034-0007	PHOTOGRAPH DSCN 1054	46
034-0007 - A	PHOTOGRAPH, ANNOTATED VERSION OF EXHIBIT 7	48
034-0008	POWER POINT, DR. KUMAR	51
034-0009	ARTICLE, "FATIGUE FRACTURE APPEARANCES"	109
034-0010	16-PAGE DOCUMENT FROM ACSR FILE	133
034-0011	24-PAGE DOCUMENT FROM METALLURGICAL PHOTOS AND DATA FILE	139
034-0012	36-PAGE DOCUMENT FROM SCENE PHOTOGRAPHS FILE	146

STENO

1 MONDAY, FEBRUARY 19, 2024

2 9:25 A.M.

3 -000-

4

5 THE VIDEOGRAPHER: We are on the record. My

09:26 6 name is Greg Buhlert. I am a notary public contracted by

09:26 7 Steno. I am not financially interested in this action,

09:26 8 nor am I a relative or employee of any of the attorneys

09:26 9 or any of the parties.

09:26 10 Today is February 19th, 2024. The time is 9:25

09:26 11 a.m. Pacific. This video deposition is taken remotely

09:26 12 via Zoom. The name of the case is Mountain View cases,

09:26 13 filed in the Superior Court of the State of California

09:26 14 for the County of Los Angeles, Case Number JCCP 5228.

09:26 15 This is the video recorded deposition of Gary

09:26 16 Fowler, PhD, Volume I. The attorney taking this

09:26 17 deposition is David Brisco.

09:27 18 We will now do the attorney role starting with

09:27 19 the taking attorney Mr. Brisco.

09:27 20 MR. BRISCO: David Brisco, Cozen O'Connor, for

09:27 21 various subrogation plaintiffs.

09:27 22 THE VIDEOGRAPHER: Okay. Our defending

09:27 23 attorney today is Mr. Mijanovic.

09:27 24 MR. MIJANOVIC: Krsto Mijanovic on behalf of

09:27 25 Liberty and Dr. Fowler.

STENO

09:27 1 THE VIDEOGRAPHER: Okay. And Mr. Romney. Is
09:27 2 Mr. Romney there?
09:27 3 Okay. Ms. Stevens.
09:27 4 MS. STEVENS: Amanda Stevens, Schroeder
09:27 5 Loscutoff Stevens, on behalf of various subrogation
09:27 6 plaintiffs.
09:27 7 THE VIDEOGRAPHER: Mr. Simon.
09:27 8 MR. SIMON: Craig Simon of Berger Kahn on
09:27 9 behalf of plaintiffs. We also have Greg McCullough
09:27 10 helping us on IT and Evan Krell.
09:27 11 THE VIDEOGRAPHER: Okay. Ms. Meyers.
09:27 12 MS. MEYERS: Dana Meyers, Cozen O'Connor, for
09:27 13 various subrogation plaintiffs.
09:27 14 THE VIDEOGRAPHER: Okay. Mr. Schroeder.
09:28 15 MR. SCHROEDER: Good morning. Eric Schroeder,
09:28 16 Schroeder Loscutoff Stevens, on behalf of various
09:28 17 subrogating plaintiffs.
09:28 18 THE VIDEOGRAPHER: Okay. Mr. Schmitt.
09:28 19 MR. SCHMITT: Good morning. Eric Schmitt,
09:28 20 Denenberg Tuffley, for subrogating plaintiff American
09:28 21 Modern Property and Casualty.
09:28 22 THE VIDEOGRAPHER: Mr. Maycon.
09:28 23 MR. MAYCON: Howard Maycon, Cozen O'Connor, for
09:28 24 various subrogation plaintiffs.
09:28 25 THE VIDEOGRAPHER: Mr. Julius.
STENO

09:28 1 MR. JULIUS: Jason Julius of Baron & Budd for
09:28 2 Public Entity plaintiffs.
09:28 3 THE VIDEOGRAPHER: Okay. Ms. Kirshner.
09:28 4 MS. KIRSHNER: Jessica Kirshner for plaintiffs.
09:28 5 THE VIDEOGRAPHER: Mr. Cadieux.
09:28 6 MR. CADIEUX: Jon Cadieux, Singleton Schreiber,
09:28 7 on behalf of individual plaintiffs.
09:28 8 THE VIDEOGRAPHER: Ms. Shkolnikov.
09:28 9 MS. SHKOLNIKOV: Lilla Shkolnikov, Grotefeld
09:28 10 Hoffman, on behalf of various subrogation plaintiffs.
09:28 11 THE VIDEOGRAPHER: Ms. Sell.
09:28 12 MS. SELL: Margaret Sell, also of Grotefeld
09:28 13 Hoffman, on behalf of various subrogating plaintiffs.
09:28 14 THE VIDEOGRAPHER: Mr. Landis.
09:28 15 MR. LANDIS: Paul Landis, from Bauman Loewe
09:28 16 Witt & Maxwell, on behalf of various subrogating
09:29 17 plaintiffs.
09:29 18 THE VIDEOGRAPHER: Okay. Mr. Gold.
09:29 19 MR. GOLD: Russ Gold, Fox Law, on behalf of
09:29 20 various individual plaintiffs.
09:29 21 THE VIDEOGRAPHER: Ms. Yee.
09:29 22 MS. YEE: Stephanie Yee on behalf of various
09:29 23 subrogating plaintiffs.
09:29 24 THE VIDEOGRAPHER: Mr. Robertson.
09:29 25 MR. ROBERTSON: Good morning, Alex Robertson on
STENO

09:29 1 behalf of various individual plaintiffs.

09:29 2 THE VIDEOGRAPHER: Mr. Loscutoff.

09:29 3 MR. LOSCOTTOFF: Bill Loscutoff for subrogating
09:29 4 plaintiffs.

09:29 5 THE VIDEOGRAPHER: Okay. Have I missed anyone?
09:29 6 Very good.

09:29 7 The court reporter today is Cheri Ortega with
09:29 8 Steno. Would the reporter please swear in the witness.

09:29 9

09:29 10 GARY FOWLER,
09:29 11 having been first duly sworn, testified as follows:

09:03 12

09:03 13 EXAMINATION

09:03 14 BY MR. BRISCO:

09:29 15 Q. Good morning, Dr. Fowler.

09:29 16 A. Good morning.

09:29 17 Q. You have been deposed a number of times I
09:30 18 understand; is that correct?

09:30 19 A. Yes.

09:30 20 Q. Okay. Approximately how many times in your
09:30 21 career?

09:30 22 A. I don't have a list but a few hundred.

09:30 23 Q. Okay. I'm going to dispense with the usual
09:30 24 admonitions that we give in depositions. Fair?

09:30 25 A. Yes, you don't need to give them.

STENO

09:30 1 Q. Okay. Forgive me, I'm playing with a new
09:30 2 platform, so there may be delays every now and then as I
09:30 3 introduce a new exhibit.

09:30 4 I will introduce the deposition notice as the
09:30 5 first exhibit. I believe we're on witness 34, so I'll
09:30 6 introduce the exhibit as 034-0001.

09:30 7 Going forward today I'll just refer to exhibits
09:30 8 as Exhibit 1, 2, 3, et cetera, and ignore the 34, Witness
09:30 9 Number 34 prefix.

09:30 10 (Exhibit 034-0001 marked.)

09:30 11 BY MR. BRISCO:

09:30 12 Q. Okay. All right, sir. I'm presenting to you
09:30 13 Exhibit 1, which is the deposition notice in this case.

09:31 14 Now, I can't see your screen so I need you to
09:31 15 just let me know if I ever need to zoom in or out of a
09:31 16 document that I'm sharing with you. You also should have
09:31 17 the option to download a document that I'm showing you.

09:31 18 Can you see Exhibit 1 on your screen?

09:31 19 A. Not yet.

09:31 20 Q. Okay. Well, that's a little concerning because
09:31 21 I'm presenting, so I expected that to be an easy yes?

09:31 22 A. Oh, there it is. It just popped up.

09:31 23 Q. Okay. Maybe there was a delay.

09:31 24 So Exhibit 1, I'm going to scroll through it
09:31 25 slowly, is your deposition notice. It's an eight-page

STENO

09:31 1 document, including requests for production of documents.

09:31 2 Presumably, you've seen your deposition notice
09:31 3 before?

09:31 4 A. I've either seen portions of it or it's been
09:31 5 discussed with me.

09:31 6 Q. Sure.

09:31 7 How about, let's test our zoom. Can you see
09:32 8 the document well or is it better when I zoom in like
09:32 9 this?

09:32 10 A. I can see it now, yes.

09:32 11 Q. Okay. And in your deposition notice of
09:32 12 Exhibit 1 we asked in Request for Production Number 3 for
09:32 13 your entire expert witness file for this case, including
09:32 14 all correspondence, notes, memoranda, reports, et cetera.

09:32 15 Do you see that there?

09:32 16 A. Yes.

09:32 17 Q. Okay. Did you produce in this case your entire
09:32 18 expert witness file?

09:32 19 A. Yes.

09:32 20 Q. Okay. So everything you relied upon or
09:32 21 reviewed that support your opinions has been produced?

09:32 22 A. I'll say mostly, yes. I received Dr. Kumar's
09:32 23 deposition, his notes and what I'll call slides. I think
09:32 24 I received those after my file was produced, and I don't
09:33 25 know if they were included in the production or not.

STENO

09:33 1 And then more recently I've received additional
09:33 2 photographs and files or depositions. And frankly, I
09:33 3 don't know if -- if they were produced as part of my file
09:33 4 or not.

09:33 5 Q. Gotcha.

09:33 6 So besides Dr. Kumar's deposition and file
09:33 7 materials that you may have received after producing your
09:33 8 file and deposition transcripts in this case, anything
09:33 9 else that you relied upon in forming your opinions that
09:33 10 you believe may not have been produced with your file?

09:33 11 A. The only thing I can think of, and it's not
09:33 12 that I relied upon it, it's that it's useful information,
09:33 13 are the photographs taken by Jerry Zamiski.

09:34 14 And again, I don't know if they were produced
09:34 15 with my file or not.

09:34 16 Q. Who is Jerry Zamiski?

09:34 17 A. He's a metallurgical engineer in the Los
09:34 18 Angeles area that had some prior involvement with this
09:34 19 case and took photographs, and those photographs were
09:34 20 sent to me.

09:34 21 Q. Was he a retained consultant for Defendant
09:34 22 Liberty in this case?

09:34 23 A. I believe so. That's my understanding.

09:34 24 Q. Did you ever have a conversation with
09:34 25 Mr. Zamiski about this case?

STENO

09:34 1 A. I have not.

09:34 2 Q. Did you receive anything other than photographs
09:34 3 that were taken by Mr. Zamiski?

09:34 4 A. Let me just check. It's at the other end of
09:34 5 the table.

09:35 6 No, just photographs.

09:35 7 Q. Sir, when were you retained in this case?

09:35 8 A. I was initially contacted on July 27th, and
09:35 9 then the first work that I actually did was about six
09:35 10 weeks later.

09:35 11 Q. When you say July 27th, is that 2023?

09:35 12 A. Yes.

09:35 13 Q. Okay. What were your instructions during
09:35 14 that -- with retention?

09:35 15 A. I was just asked if I was available to consult
09:36 16 with the attorneys representing Liberty, and I indicated
09:36 17 that I was.

09:36 18 Q. Okay. Were you advised that you were replacing
09:36 19 Jerry Zamiski in this case?

09:36 20 A. No.

09:36 21 Q. Jerry Zamiski is a metallurgist in the same
09:36 22 general field as you are?

09:36 23 A. Similar, yes.

09:36 24 Q. Did you ask why you -- well, strike that.

09:36 25 Let me first put in another exhibit. This is
STENO

09:36 1 marked as Exhibit 2 to your deposition, the defense
09:36 2 expert witness designation. I'm going to present it to
09:37 3 you now so that you should be able to see it. I'm going
09:37 4 to scroll down to Page 6, which has a section regarding
09:37 5 your intended testimony.

09:37 6 Have you seen this document before, sir?

09:37 7 A. I believe I have.

09:37 8 (Exhibit 034-0002 marked.)

09:37 9 BY MR. BRISCO:

09:37 10 Q. Okay. All right. Right in the middle of the
09:37 11 Page 6 of the PDF but marked as Page 5 on the document of
09:37 12 Exhibit 2 it states that, Dr. Fowler is expected to
09:37 13 testify regarding general principals of metallurgy, as
09:37 14 well as specific testimony related to the subject
09:37 15 incident, including the condition of the subject
09:38 16 conductors, triplex and other physical evidence collected
09:38 17 in causation of those conditions. Dr. Fowler is also
09:38 18 expected to testify to the opinions, if any, offered by
09:38 19 plaintiffs' designated experts that fall within his area
09:38 20 of expertise.

09:38 21 Do you see that, sir?

09:38 22 A. Yes.

09:38 23 Q. Okay. Is that an accurate reflection of the
09:38 24 categories of opinions that you intend to offer in this
09:38 25 case?

STENO

09:38 1 A. Yes.

09:38 2 Q. And do you intend to offer any other opinions
09:38 3 not reflected in this Exhibit 2 expert designation?

09:38 4 A. Well, that's pretty brief. I provided this
09:38 5 morning a more comprehensive list of opinions, but those
09:38 6 cover the general areas.

09:38 7 Q. Okay. Speaking of which, I'm uploading now the
09:39 8 document we received, plaintiffs received from Defense
09:39 9 Counsel this morning slightly after the 9:00 a.m. start
09:39 10 time of your deposition. It is a three-page document
09:39 11 that I will mark as Exhibit 3 to your deposition.

09:39 12 Okay. Can you see Exhibit 3, sir?

09:39 13 A. Yes.

09:39 14 (Exhibit 034-0003 marked.)

09:39 15 BY MR. BRISCO:

09:39 16 Q. Okay. Looks like we have nine points of
09:39 17 opinions with some of them having multiple bullet points
09:39 18 under them.

09:39 19 Sir, when did you make this document?

09:39 20 A. Yesterday.

09:39 21 Q. Okay. When did you provide this document to
09:40 22 Counsel or defendant?

09:40 23 A. This morning.

09:40 24 Q. Okay. What time this morning?

09:40 25 A. Just before 9 o'clock, but not by much.

STENO

09:40 1 Q. Okay. Did you make any modifications to the
09:40 2 document this morning?

09:40 3 A. I corrected some typos.

09:40 4 Q. Let me get one more document into the record
09:41 5 before we proceed, sir. Plaintiffs also received this
09:41 6 morning a list of prior deposition and trial testimony
09:41 7 for you. I'm going to mark that single page document as
09:41 8 Exhibit 4.

09:41 9 Do you see this Exhibit 4, sir?

09:41 10 A. Yes.

09:41 11 (Exhibit 034-0004 marked.)

09:41 12 BY MR. BRISCO:

09:41 13 Q. Okay. And this is -- it says on this
09:41 14 deposition trial testimony, and it's going back to the
09:42 15 start of 2020; is that correct, sir?

09:42 16 A. Yes.

09:42 17 Q. And you said earlier you've testified hundreds
09:42 18 of times in deposition, correct?

09:42 19 A. Yeah. I believe I said a few hundred, yes.

09:42 20 Q. And is this -- what is this Exhibit 4 intended
09:42 21 to represent, simply the last five years of testimony
09:42 22 or --

09:42 23 A. Actually, it's a list I keep that's supposed to
09:42 24 go back four years, and this goes back to the beginning
09:42 25 of 2020.

STENO

09:42 1 Q. So these are all the cases you've testified on
09:42 2 as an expert witness in either deposition or trial in the
09:42 3 last four years?

09:42 4 A. Correct.

09:42 5 Q. How many of these cases were you testifying on
09:42 6 behalf of the defense as opposed to the plaintiffs?

09:42 7 A. I believe all these are on behalf of a
09:42 8 defendant.

09:42 9 Q. Okay. How about in your career testifying at
09:43 10 deposition and trial, what percentage would you say are
09:43 11 for the defense as opposed to the plaintiff?

09:43 12 A. I think in the past, as I recall, it was more
09:43 13 two-thirds defendant, one-third plaintiff. And in recent
09:43 14 years it's been more heavily weighted towards a
09:43 15 defendant.

09:43 16 Q. Let me ask you about some of these topics for
09:43 17 your list of Exhibit 4 depositions over the last four
09:43 18 years. Do any of these cases involve failure of an ACSR
09:43 19 type conductor causing a wildfire?

09:43 20 A. The James versus PacifiCorp, that was a trial
09:44 21 in Portland that involved, as I recall, five different
09:44 22 fire origins. And also, as I recall, they were all ACSR
09:44 23 and there were various claims relating to each fire
09:44 24 origin.

09:44 25 Q. Okay. And did you come up with an opinion in
STENO

09:44 1 the James case as to the cause of the fire or fires
09:44 2 relating to the ACSR conductor?

09:44 3 A. Well, we can call it the James case, but there
09:44 4 were really five different fires, and for each fire I
09:44 5 examined the evidence and made metallurgical observations
09:44 6 as to the condition of the ACSR.

09:44 7 Q. Okay. In any of those five cases did you
09:45 8 render an opinion that the ACSR conductor failed from
09:45 9 fatigue fracture?

09:45 10 A. I did not. There's no evidence of a fatigue
09:45 11 fracture in the ACSR on any of those five fires.

09:45 12 Q. Okay. Did you render an opinion in any of
09:45 13 those five fires relating to the James case that the ACSR
09:45 14 conductor came down due to line slap?

09:45 15 A. I know that was a consideration in one of them,
09:45 16 but the arcing on one conductor was oxidized and did not
09:45 17 match what was present or the lack of arcing on the
09:45 18 mating conductor or the nearest conductor.

09:45 19 Q. Uh-huh.

09:45 20 A. So I know I offered testimony that there was
09:45 21 not an indication of line slap, nor was there an
09:46 22 allegation in one of the fires. I know another fire a
09:46 23 tree fell on it and broke the ACSR. And I believe there
09:46 24 were two others where trees were involved.

09:46 25 Q. Gotcha.

STENO

09:46 1 Now, you anticipated my next question. I
09:46 2 appreciate it. I was going to ask you to give me a brief
09:46 3 synopsis of just what your opinions of what brought the
09:46 4 lines down in those five cases.

09:46 5 You said one involved tree fall and two others
09:46 6 that involved trees; is that correct?

09:46 7 A. You know, it's been long enough that I may not
09:46 8 remember the precise number, but my recollection is there
09:46 9 were three of them that involved trees, either -- I know
09:47 10 one of them with certainty broke the ACSR and it fell to
09:47 11 the ground. Two of them a tree was involved, but I think
09:47 12 one of them the conductors had been replaced, so not all
09:47 13 the evidence was available. One of them there was an
09:47 14 allegation of a branch spanning two conductors and
09:47 15 creating arcing.

09:47 16 So, you know, there were a variety of
09:47 17 conditions relating to those five fires.

09:47 18 Q. Uh-huh. Besides the James case on our
09:47 19 Exhibit 4 list of testimony, any other cases that
09:47 20 involved an ACSR conductor?

09:47 21 A. No. The others are aviation, except for the
09:48 22 Gonzalez case.

09:48 23 Q. So all the others were aviation, except for the
09:48 24 Gonzalez case.

09:48 25 When you say aviation, what does that mean,
STENO

09:48 1 like what brought a plane or a helicopter down?

09:48 2 A. Correct, or what created the damage that was at
09:48 3 issue.

09:48 4 Q. All right. We've been talking about prior
09:48 5 deposition and trial testimony. I want to ask you more
09:48 6 broadly in terms of just retention as an expert. How
09:48 7 many times have you been retained by -- to work on a
09:48 8 wildfire case?

09:48 9 A. I don't have a list.

09:48 10 Q. Best estimate.

09:48 11 A. Dozens of times.

09:48 12 Q. Okay. Of those times you've been retained to
09:49 13 work on a wildfire case, what percentage of the time have
09:49 14 you been retained to work for a defending utility as
09:49 15 opposed to the plaintiff's side?

09:49 16 A. Well, I remember a plaintiff case from a fire
09:49 17 that started in the Sacramento area where I was retained
09:49 18 by the plaintiff. Just recently I was retained by a
09:49 19 communication company in a wildfire in Colorado, and
09:49 20 there may be an odd one here or there, but the rest of
09:49 21 them have been retained by the utility.

09:49 22 Q. Okay. And so when you say "by the utility"
09:49 23 that includes Southern California Edison is one of those
09:49 24 utilities?

09:49 25 A. Yes.

STENO

09:49 1 Q. How many times have you been retained to defend
09:50 2 Southern California Edison in a case?

09:50 3 A. Well, I'm not paid or retained to defend. I'm
09:50 4 retained to examine the evidence as a metallurgical and
09:50 5 materials engineer. But they have asked me to look at
09:50 6 evidence dozens of times. I don't keep a list so I don't
09:50 7 have a specific number.

09:50 8 Q. What other utilities besides Southern
09:50 9 California Edison have you been retained by regarding a
09:50 10 wildfire case?

09:50 11 A. PacifiCorp, they had a series of fires several
09:50 12 years ago, and I looked at more than five, but probably
09:50 13 as many as eight, possibly ten fires for them. And I
09:50 14 looked at one for Nevada Energy. And I looked -- I
09:51 15 worked for a utility down in Texas whose name I don't
09:51 16 recall.

09:51 17 Q. So other than the one recent plaintiff case you
09:51 18 referenced and the communications company in Colorado,
09:51 19 have all your retentions in wildfire cases been for the
09:51 20 utility?

09:51 21 A. As best I can recall, yes.

09:51 22 Q. Sir, I presented again Exhibit 3 to your
09:52 23 deposition, which is your list of testified -- your list
09:52 24 of opinions in this case. I'm going to start working
09:52 25 through some of these and have you help me understand

STENO

09:52 1 your opinion and the basis for it.

09:52 2 I'm going to read the first one. I just got
09:52 3 this this morning after the depo start, so I'm going to
09:52 4 read the first one into the record and then ask you some
09:53 5 questions, sir.

09:53 6 Opinion 1 in Exhibit 3 says: The evidence
09:53 7 indicates that the center and north ACSR conductor is
09:53 8 between Poles 226731 west pole and 34334 east pole,
09:53 9 experienced contact during windy conditions on
09:53 10 November 17, 2020.

09:53 11 I'm going to read the full bullet points here,
09:53 12 sir, make sure I've properly encapsulated your opinions.

09:53 13 The north conductor separation was
09:53 14 approximately 135 feet eight inches from the west pole,
09:53 15 17 feet from the lab reference cut. Separation on the
09:53 16 north conductor was caused by damage created during
09:53 17 arcing between the north and center conductors. The
09:53 18 north phase exhibit had multiple areas of arcing on both
09:54 19 sides of the separated ends. The center conductor
09:54 20 exhibited multiple areas of arcing. The most severe
09:54 21 arcing matches the location of the north conductor
09:54 22 separation. Conductor clashing typically occurs within
09:54 23 the center third of the span. The span was 304 feet.
09:54 24 The separation strands estimated to be about 50 by
09:54 25 Dr. Kumar on the north and center conductors were all

STENO

09:54 1 caused by arcing during conductor clashing. Recloser
09:54 2 data analyzed by Don Russell indicates phase to phase
09:54 3 fault at approximately 11:55 a.m., followed by three
09:54 4 phase to ground faults prior to lockout.

09:54 5 Sir, did I accurately read your first opinion
09:54 6 into the record?

09:54 7 A. Yes.

09:54 8 Q. Let's take this in chunks. So -- and I'm not
09:54 9 sure, I have your file in front of me so if we need to
09:54 10 pull up a certain photo that you can reference we'll do
09:55 11 that. But can you walk me through the basis for your
09:55 12 Opinion Number 1?

09:55 13 A. My basis is examination of the evidence that
09:55 14 show arcing on the north conductor and the center
09:55 15 conductor.

09:55 16 Q. When --

09:55 17 A. The windy descriptions -- the windy conditions,
09:55 18 rather, and the day were provided as I recall in the
09:55 19 Cal-Fire report. And plus in witness depositions.

09:55 20 Were you asking about the first sentence or the
09:55 21 first bullet point?

09:55 22 Q. Yeah. Let's talk about -- let's take it
09:55 23 sentence by sentence here. So I was asking more
09:56 24 generally about the basis for the opinion and I
09:56 25 appreciate your response. Let me take it bullet point by

STENO

09:56 1 bullet point.

09:56 2 The first part that, the center and north ACSR
09:56 3 conductors experienced contact during windy conditions on
09:56 4 November 17th, 2020, what is your basis for that opinion,
09:56 5 that the two conductors contacted on the day of the fire?

09:56 6 A. You see what I would refer to as fresh melting
09:56 7 on both conductors in the same location. And if you go
09:56 8 down to the last bullet point in discussions with
09:56 9 Dr. Russell, he indicated that there was a phase to phase
09:56 10 fault at approximately 11:55 a.m., and that is consistent
09:57 11 with the physical evidence that shows arcing between the
09:57 12 north conductor and the center conductor.

09:57 13 Q. Are you of the opinion that the contact between
09:57 14 the two conductors caused the phase to phase fault?

09:57 15 A. I'm telling you it's consistent with it and the
09:57 16 timing matches.

09:57 17 Q. When --

09:57 18 A. I think I would defer to Dr. Russell, because
09:57 19 he's really the specialist in looking at recloser data,
09:57 20 but I found the information that he provided to me was
09:57 21 consistent with the north conductor causing or contacting
09:57 22 the center conductor.

09:57 23 Q. And when you say the physical evidence you
09:58 24 observed that supports this, you talked about fresh
09:58 25 melting?

STENO

09:58 1 A. Correct.

09:58 2 Q. Okay.

09:58 3 A. I talked about arcing damage that is, what I
09:58 4 referred to, as fresh.

09:58 5 Q. And what does that mean when an arc damage is
09:58 6 fresh?

09:58 7 A. Well, in looking at conductors often time the
09:58 8 evidence, if there's arc damage, the evidence is taken
09:58 9 into custody and put in storage, and it retains the
09:58 10 non-oxidized appearance where I've seen multiple
09:58 11 conductors that have had some evidence of arcing, but the
09:58 12 arc area has been oxidized, and therefore, would not be
09:58 13 contemporaneous with the fire origin that occurred on the
09:59 14 day where there was evidence of conductor contact.

09:59 15 Q. Uh-huh. So you'll forgive me, as you've
09:59 16 experienced numerous times in your depositions that
09:59 17 sometimes you're dealing with lay attorneys and we're
09:59 18 going to have to simplify things sometimes.

09:59 19 So when you say -- is it fair then to say more
09:59 20 oxidation for you is -- indicates an older arc mark, as
09:59 21 opposed to less or no oxidation, which means fresh, as
09:59 22 you put it?

09:59 23 A. In simple terms, yes. It's a little more
09:59 24 complicated than that. But as an example, aluminum after
09:59 25 the passage of a rather substantial amount of time will

STENO

10:00 1 oxidize and turn a dull gray appearance. Copper, after
10:00 2 the passage of time, will turn a green appearance. And
10:00 3 when the coloration of the arc damage matches the
10:00 4 coloration of the adjacent conductor, I typically refer
10:00 5 to that as old arc damage. Whereas new or fresh arc
10:00 6 damage has a shinier appearance; however, it, too, can
10:00 7 have some oxide when viewed in the electron microscope or
10:00 8 it has some discoloration when exposed to a ground fire.

10:00 9 So there are different conditions that can
10:00 10 change the appearance of the arcing.

10:00 11 Q. We've been using terms like fresh, new, old.
10:01 12 Can you date the arc marks in this case?

10:01 13 A. Well, unfortunately, you can't come up with a
10:01 14 precise dating, because there's too many variables that
10:01 15 control the oxidation. And in California which has a
10:01 16 more arid environment, it takes longer for the arc damage
10:01 17 to become oxidized, but it eventually will.

10:01 18 But fresh is usually referred to with the
10:01 19 characteristics that I just gave you.

10:01 20 And old is usually characterized by the
10:01 21 characteristics I just provided.

10:01 22 Q. Uh-huh. Just to clarify, if you can't date it
10:01 23 specifically are you able to give a date range? So, you
10:01 24 know, this -- this arc mark is new and is, you know,
10:02 25 three to six months old, and this arc mark is old, it's

STENO

10:02 1 over two years old?

10:02 2 A. Not precisely, but usually when it's two years
10:02 3 old you can tell that it's a former arc area. There's
10:02 4 been enough oxidation in my experience.

10:02 5 Q. Are you aware of any articles or studies that
10:02 6 support your opinions as to whether an arc mark is older
10:02 7 or newer or fresh?

10:02 8 A. You know, I -- in my work I haven't seen an
10:02 9 article that would address that. I think mostly I've
10:02 10 seen metallurgists, including myself and even Dr. Kumar,
10:02 11 that address some whether it's new or old. Again,
10:02 12 depending on the oxide layer that is formed since the
10:03 13 formation of the arc damage.

10:03 14 Q. Sticking with your -- the first sentence of
10:03 15 Opinion 1 -- I won't present it the whole time unless you
10:03 16 need it up, and if you need it up, sir, let me know.

10:03 17 A. I have -- I have a hard copy here so...

10:03 18 Q. Okay. Then I won't need to put it up for your
10:03 19 benefit.

10:03 20 The contact between the center and north
10:03 21 conductors on the day of the fire and the corresponding
10:03 22 arc mark that you identified, would that have created
10:03 23 sparks that would have been a competent ignition source
10:03 24 for a fire?

10:03 25 A. Well, when arcing occurs you expel molten

STENO

10:03 1 metal. There's a certain pressure associated with the
10:04 2 arcing event. Whether that's a competent ignition source
10:04 3 or not, I haven't addressed that.

10:04 4 Q. Sure.

10:04 5 And what would you need to know to address
10:04 6 whether the arcing between the center and north
10:04 7 conductors in this case was a competent ignition source?

10:04 8 A. Well, I typically wouldn't address that.
10:04 9 There's a professor at Berkeley that's probably the best
10:04 10 in the world at establishing that.

10:04 11 Q. Who is that?

10:04 12 A. Carlos Pao.

10:04 13 Q. Do you believe that if there was a fuel source
10:04 14 underneath the center and north phase conductors when
10:04 15 they emitted that arc spark that the fuel source could be
10:04 16 ignited?

10:04 17 A. I don't have any opinion. I think that that
10:05 18 would generally be beyond what I addressed in this case.

10:05 19 Q. Okay. And I guess -- I'm not asking you -- I
10:05 20 appreciate you weren't asked to determine whether an arc
10:05 21 spark caused the fire. I guess I'm more asking whether
10:05 22 something is a possible competent ignition source, right.
10:05 23 So not whether you did the analysis in this case, but
10:05 24 just as a general matter of commonsense and your
10:05 25 experience as a metallurgist, can an arc from a line slap

STENO

10:05 1 event ignite a fire? Is that possible?

10:05 2 A. I know there have been some cases where I
10:05 3 believe people have offered that opinion.

10:05 4 Q. Sure. And I was just -- want to know, do you
10:05 5 have that understanding, that an arc from a line slap
10:05 6 event can cause a fire?

10:05 7 A. Well, I certainly haven't studied it in this
10:05 8 case and there's enough variables that I wouldn't be able
10:06 9 to offer an opinion.

10:06 10 Q. Sure. Again, not talking about whether it was
10:06 11 the cause of the fire in this case. Talking generally
10:06 12 about an arc from a line slap event from two lines, such
10:06 13 as the center and north phase conductor. Do you know --
10:06 14 do you know what the temperature is of an arc from --
10:06 15 from two conductors, such as the center and north phase?

10:06 16 A. Well, there's two temperatures you ought to
10:06 17 consider. The arc temperature, which is usually, at
10:06 18 least in the literature, thought to be about 5,000
10:06 19 Farenheit or above. And then there's the metal
10:06 20 temperature. And if the molten metal stays on the
10:06 21 conductor that would typically suggest a metal
10:06 22 temperature closer to the melting temperature of that
10:06 23 metal.

10:06 24 Q. Gotcha.

10:06 25 And in this case the -- we're dealing with
STENO

10:07 1 aluminum with a steel core, so what are the melting
10:07 2 temperatures of the aluminum and steel?

10:07 3 A. Aluminum -- pure aluminum is 1,220 Farenheit.
10:07 4 The ACSR conductor actually melts over a temperature
10:07 5 range of 1195 to 1215 --

10:07 6 Q. Okay.

10:07 7 A. -- Farenheit. And steel would be the order of
10:07 8 26, 2700 Farenheit, depending on the carbon content.

10:07 9 Q. So are any of the temperatures we just
10:08 10 discussed, the ACSR on the lower range at 1195 Farenheit,
10:08 11 up to the arc temperature of 5,000 Farenheit, are any of
10:08 12 those temperatures high enough to ignite combustibile
10:08 13 grasses?

10:08 14 A. Well, it's not what they are at the arc side,
10:08 15 it's what they are when they hit the ground.

10:08 16 Q. Do you have an understanding as to what
10:08 17 temperature they are when they hit the ground?

10:08 18 A. No. That's a detailed analysis that is beyond
10:08 19 my expertise.

10:08 20 Q. Okay. Now, we've been talking about a line
10:08 21 slap event in the air and whether that arcing event can
10:08 22 ignite combustibile grasses or vegetation down below. How
10:09 23 about once the line comes down if the line is energized,
10:09 24 and now you have these arc temperatures in direct contact
10:09 25 with the ground. Do you believe that an energized

STENO

10:09 1 conductor, such as the north phase conductor we have in
10:09 2 this case, is a competent ignition source if it's
10:09 3 energized when it contacts the ground?

10:09 4 A. I've seen that in other cases. For this case,
10:09 5 I do not know.

10:09 6 Q. You don't know if the energized conductor in
10:09 7 this case caused the fire?

10:09 8 A. Correct.

10:09 9 Q. Would you agree that the energized conductor in
10:09 10 this case could cause a fire, it's a competent ignition
10:09 11 source?

10:09 12 A. Frankly, I don't know. There's enough
10:09 13 variables and there's enough people that are capable of
10:10 14 answering that question that I typically don't.

10:10 15 Q. No. I appreciate you typically don't. I just
10:10 16 want to know if you're even aware that an energized
10:10 17 conductor, such as the north phase conductor contacting
10:10 18 the ground, could cause a fire?

10:10 19 A. As I've said, I've seen it before.

10:10 20 Q. You've seen it actually ignite the ground
10:10 21 before?

10:10 22 A. No. I've seen where there's been evidence of
10:10 23 arcing on the ground and people have identified that as
10:10 24 the initiation site.

10:10 25 Q. Okay. So you have seen cases where an
STENO

10:10 1 energized conductor has contacted the ground and there's
10:10 2 evidence supporting the conductor causing the fire?

10:10 3 A. I have other cases where people have concluded
10:10 4 that.

10:10 5 Q. Okay. You just didn't do that analysis
10:10 6 personally in this case, correct?

10:10 7 A. Well, I did the metallurgical examination, and
10:10 8 I realize there's some photographs where the captions
10:11 9 indicate arcing on the ground. By the time I went out to
10:11 10 the scene that evidence was no longer available, and the
10:11 11 conductor when I examined it had one little arc tick that
10:11 12 was away from the area of separation. And I don't know
10:11 13 if that would have been sufficient to ignite the
10:11 14 vegetation or not.

10:11 15 Q. Let me get some terminology right so we'll be
10:11 16 on the same page. I've seen from your file you are
10:11 17 familiar with the terms pole one and pole two in this
10:11 18 case?

10:11 19 A. Yes.

10:11 20 Q. Okay. And so pole one being the easternmost
10:12 21 pole closest to the Mountain View Barbecue?

10:12 22 A. Correct.

10:12 23 Q. And pole two being the westernmost pole in
10:12 24 which the north and center phases are connecting poles
10:12 25 one and pole two. Sound good?

STENO

10:12 1 A. Okay. Yes.

10:12 2 Q. Shorthand, I like to refer to them as pole one
10:12 3 and pole two, and throughout your deposition I may use
10:12 4 the term Item 1 or Item 2. And I suspect you're familiar
10:12 5 with those terms in this case as well but let me clarify.

10:12 6 Both Item 1 and Item 2 are referring to the
10:12 7 north field phase conductor in this case. Sound good?

10:12 8 A. Yes.

10:12 9 Q. Okay. And when I say -- sorry, go ahead.

10:12 10 A. The only problem with using pole one and pole
10:12 11 two is I don't know if people will confuse that with
10:13 12 Item 1 and Item 2, and they are not the same. And
10:13 13 that's --

10:13 14 Q. I -- sorry. Go ahead.

10:13 15 A. That's why I tried to stay with the east and
10:13 16 west pole.

10:13 17 Q. Okay. Item 1 is connected to, after the north
10:13 18 phase field side conductor failed and came down to the
10:13 19 ground, Item 1 was connected to the east pole, correct?

10:13 20 A. Yes.

10:13 21 Q. Okay. And Item 2 was the portion of the north
10:13 22 field conductor that was connected to the west pole,
10:13 23 correct?

10:13 24 A. Correct.

10:13 25 Q. Okay. And so when you talk about seeing arcing
STENO

10:13 1 on the subject conductor, you're talking about Item
10:13 2 Number 2?

10:13 3 A. There was arcing on Item 1 and Item 2.

10:13 4 Q. No. I appreciate that. I think -- right now
10:13 5 we were talking about the evidence of, you said there was
10:13 6 one area of arcing on the subject conductor, and I think
10:13 7 you were talking about from contact with the ground, but
10:13 8 that's where I was trying to zero in on on what you were
10:14 9 referring to?

10:14 10 A. As I said, there's a small arc mark, and I
10:14 11 think I referred to it as an arc tick, which is -- can be
10:14 12 used to identify a small arc area that potentially could
10:14 13 have been from ground contact.

10:14 14 Q. Uh-huh. And you observed this arc tick
10:14 15 personally yourself or through the photographs?

10:14 16 A. No. I observed it during the lab examination.

10:14 17 Q. Okay. And how far from the failure point on
10:14 18 Item 2 was this arc tick located?

10:14 19 A. It shows up on the second page of my notes from
10:14 20 December 7th and it's identified as V., which stands for
10:15 21 very small arc mark, in about the middle between the
10:15 22 reference cut at zero and the cut at 15 feet.

10:15 23 And, you know, I should say that during the
10:15 24 June 2023 lab examination there was -- the conductor was
10:15 25 cut. And for the purposes of the location of subsequent

STENO

10:15 1 photographs, it all relates back to a reference cut that
10:15 2 is at zero. Unfortunately, it doesn't correspond to the
10:16 3 reference through the conductor between the poles.

10:16 4 So just to help you out for a minute, there's
10:16 5 an additional page where I've put the dimensions, and
10:16 6 that identifies the lab cut at 118 feet eight inches.
10:16 7 And then I put Ref.0. That's reference zero for the lab
10:16 8 dimensions.

10:16 9 Q. Were you present for the June 2023 lab exam?

10:16 10 A. No, I wasn't.

10:16 11 Q. Do you know if Mr. Zamiski was present?

10:16 12 A. It's my understanding that he was.

10:16 13 Q. Okay.

10:16 14 A. But I haven't confirmed that because I haven't
10:16 15 spoken to him.

10:17 16 Q. Did you attempt to call Mr. Zamiski regarding
10:17 17 his work in this case?

10:17 18 A. I attempted on December 7th, 2023, when we were
10:17 19 aligning the various parts that had been -- parts of the
10:17 20 conductors that had been cut during the prior exam. And
10:17 21 I called him to get his input, but I didn't reach him at
10:17 22 that time.

10:17 23 Q. Okay. You never received a call back?

10:17 24 A. I think I did, but it went to voicemail, and
10:17 25 then the issue had been resolved by then.

STENO

10:17 1 Q. So coming back to the arc tick, if I followed
10:17 2 you were telling me it's -- I was trying to understand
10:17 3 its location for you in reference to the failure area.
10:18 4 Are you able to tell me how -- what the distance is of
10:18 5 the arc tick from the failure area of Item Number 2?

10:18 6 A. My notes indicate that it was about in the
10:18 7 middle of the piece of conductor between the reference
10:18 8 cut at zero and the cut made at 15 feet.

10:18 9 Q. Okay. So right in the middle there, somewhere
10:18 10 around seven to eight feet?

10:18 11 A. Yes. It will probably show up in the
10:18 12 photographs where there's a tape measure next to it.

10:18 13 Q. Okay. And the arc tick you referred to, you
10:18 14 said it's potentially from the energized line contacting
10:18 15 the ground; is that correct?

10:18 16 A. Yes.

10:18 17 Q. Okay. And do you believe that the north field
10:19 18 conductor was energized, Item Number 2 was energized when
10:19 19 it contacted the ground?

10:19 20 A. Yes.

10:19 21 Q. Okay. And is the Item Number 2 capable of
10:19 22 igniting a fire on contact with the ground?

10:19 23 A. I think you've asked me that and I've seen
10:19 24 where people have opined that fallen conductors can
10:19 25 ignite a ground fire.

STENO

10:19 1 Q. I did. I apologize.

10:19 2 Did you see any other evidence of arcing on the
10:19 3 Item Number 2 consistent with contact with the ground?

10:19 4 A. Nothing that I could confirm. I attributed the
10:19 5 balance of the arcing to conductor clash between the
10:20 6 north conductor and the center conductor.

10:20 7 Q. And as you said before, whether the conductor
10:20 8 clash while it's in the air is capable of igniting a fire
10:20 9 is outside of your area of expertise?

10:20 10 A. Yes.

10:20 11 Q. Okay.

10:20 12 A. At least for this case because I haven't
10:20 13 studied it.

10:21 14 Q. I'm going to introduce the other document
10:21 15 produced to us with your opinions this morning entitled,
10:22 16 "Span Dimensions." We'll mark this as Exhibit 5 to your
10:22 17 deposition, sir.

10:22 18 (Exhibit 034-0005 marked.)

10:22 19 BY MR. BRISCO:

10:22 20 Q. Do you have a copy in front of you?

10:22 21 A. Yes.

10:22 22 Q. Okay. I'm going to present it so everybody can
10:22 23 see it, but it's placed vertically -- since you have a
10:22 24 copy in front of you I won't worry about getting it
10:22 25 placed appropriately unless we need to mark on it.

STENO

10:22 1 What is this document, Exhibit 5, that's
10:22 2 entitled "Span Dimensions"?

10:22 3 A. Well, it shows the east pole and the west pole,
10:22 4 and then the north conductor and the center conductor and
10:22 5 the various locations where it was cut or where the north
10:22 6 conductor separated. And also, there are splices
10:23 7 identified on this document.

10:23 8 Q. I'm going to share my screen while we talk
10:23 9 about this Exhibit 5, because I can't orient the uploaded
10:23 10 exhibit properly.

10:23 11 Sir, can you see the screen with the Exhibit 5
10:23 12 on it?

10:23 13 A. Yes.

10:23 14 Q. Okay. So it looks like the -- this -- between
10:23 15 the west pole on the left side and the east pole on the
10:23 16 right we have this top line of dashes going over the top.
10:23 17 Is that the center phase?

10:23 18 A. The uppermost one is, yes.

10:23 19 Q. Right. Okay. Center phase has been referred
10:23 20 to in the evidence inspections as Item Number 3?

10:23 21 A. Correct.

10:23 22 Q. Or at least a portion of the center phase?

10:23 23 A. Yes, that's correct.

10:23 24 Q. We've been -- we see here, I see Item Number 2,
10:24 25 which we've been talking about earlier is the portion of

STENO

10:24 1 the north field side conductor that was attached to the
10:24 2 west pole?
10:24 3 A. Yes.
10:24 4 Q. Okay. These are your notes, sir?
10:24 5 A. Yes. I put this together.
10:24 6 Q. Okay. And it says here in the middle -- well,
10:24 7 let me first say, Item 1 here we see is marked showing
10:24 8 the line connecting, the north field line connecting to
10:24 9 the east pole?
10:24 10 A. Yes.
10:24 11 Q. Okay. The separation is marked 135 feet eight
10:24 12 inches?
10:24 13 A. Correct.
10:24 14 Q. Is that the distance from the west pole?
10:24 15 A. Yes.
10:24 16 Q. All right. And right here you note next to the
10:24 17 separation of Item 1 and 2 you say lab cut at 118 feet
10:25 18 eight inches, reference point zero?
10:25 19 A. Yeah. Reference is abbreviated so the period
10:25 20 goes with R-e-f, and zero is just where the dimensions
10:25 21 start for the numbers that are on the lab samples.
10:25 22 Q. And when we talked about the arc tick that was
10:25 23 potentially from the conductor contacting the ground,
10:25 24 that was located in the area between this lab cut and the
10:25 25 separation here in Exhibit 5?

STENO

10:25 1 A. Yes. More specifically, my notes show it's
10:25 2 between reference zero and then the cut at 15 feet, which
10:25 3 is before the separation.

10:25 4 Q. Gotcha.

10:25 5 Let me just finish -- we'll take a break in a
10:26 6 few minutes, sir. I just want to finish asking questions
10:26 7 about this document.

10:26 8 Here, just to the left of the lab cut on the
10:26 9 Item Number 2, it says old splice 109 feet.

10:26 10 Do you see that, sir?

10:26 11 A. Yes.

10:26 12 Q. Okay. And what's the purpose of that notation?

10:26 13 A. There was a former splice -- by former I mean
10:26 14 predated the fire -- and that little squiggle in front is
10:26 15 approximately 109 feet from the west pole. And then on
10:27 16 the other side of the separation is another old splice,
10:27 17 meaning it was oxidized at about 175 feet, six inches
10:27 18 from the west pole.

10:27 19 Q. Do you have any idea of when those splices were
10:27 20 installed?

10:27 21 A. I don't have the specific date, other than they
10:27 22 were oxidized, and that's why I referred to them as an
10:27 23 old splice, as distinguished from the new splices on the
10:27 24 center phase, which I believe the testimony is that was
10:27 25 cut down after the fire.

STENO

10:27 1 Q. Right. Okay. Sticking with the north field
10:27 2 conductor and these old splices marked in your notes on
10:27 3 Exhibit 5. Do you know how old the north phase conductor
10:27 4 was at the time of the fire?

10:28 5 A. I don't know the specific number of years, but
10:28 6 the presence of two splices in the mid span region would
10:28 7 suggest that that was newer than the ends.

10:28 8 Q. Do you know when the splices that you have
10:28 9 marked old splice were installed?

10:28 10 A. No.

10:28 11 Q. Okay. Could it have been more than five years
10:28 12 before the fire?

10:28 13 A. You know, I don't know. All I can tell you is
10:28 14 that it was oxidized to the point that would suggest that
10:28 15 it predated or would indicate that it predated the fire.

10:28 16 Q. Same with the center phase, do you know how old
10:29 17 the center phase conductor was?

10:29 18 A. I don't know, other than that section that says
10:29 19 new conductor between two splices, that was replaced
10:29 20 after the fire.

10:29 21 Q. Okay. But how about the Item Number 3 that you
10:29 22 examined, do you know how old Item Number 3 was?

10:29 23 A. I do not.

10:29 24 Q. Okay. How about the roadside conductor, do you
10:29 25 know how old the roadside conductor was?

STENO

10:29 1 A. Well, I'll tell you what I know is the roadside
10:29 2 conductor, my notes reflect on the last page, was
10:29 3 oxidized and it had a splice at the east end.

10:30 4 Q. Uh-huh. Okay. And what is the significance of
10:30 5 that?

10:30 6 A. It had been out there a while, enough to
10:30 7 oxidize, and I just noted the presence of a splice.

10:30 8 Q. Okay. Now, are you able to give me any more
10:30 9 specificity other than it had been out there awhile?

10:30 10 A. No. You can't date these because aluminum is
10:30 11 fairly reactive, in the sense that it oxidizes in a
10:30 12 relatively short period of time, and the oxide remains
10:30 13 stable and it doesn't change much.

10:30 14 Q. We have been going for a little more than an
10:30 15 hour, sir. Why don't we take a ten-minute break and keep
10:30 16 going.

10:30 17 A. Okay.

10:31 18 Q. Thank you.

10:31 19 THE VIDEOGRAPHER: The time is 10:30 a.m. We
10:31 20 are off the record.

10:44 21 (A recess was taken.)

10:44 22 THE VIDEOGRAPHER: The time is 10:43 a.m. We
10:44 23 are back on the record.

10:44 24 BY MR. BRISCO:

10:44 25 Q. Dr. Fowler, earlier when we were talking about
STENO

10:44 1 the arc tick that was potentially from the conductor
10:44 2 contact -- Item Number 2 contacting the ground, do you
10:44 3 have a photograph in your file that you can refer me to
10:45 4 regarding that arc tick?

10:45 5 A. Yes. If you look around Photograph 1052.

10:45 6 Q. This would be in the folder marked from your
10:45 7 December 7th inspection?

10:45 8 A. Yes.

10:45 9 Q. Okay. There's two of those folders, one of
10:45 10 them is with an SM on it.

10:45 11 A. Correct. I had a technician there that also
10:45 12 took photographs.

10:45 13 Q. Okay.

10:45 14 A. But this would be the one that is not marked
10:45 15 with SM, and my photographs start out with DSCN.

10:46 16 Q. So it would be DSCN 1052?

10:46 17 A. Correct. And it may include a few photographs
10:46 18 before and a few photographs after.

10:46 19 Q. Okay. Thank you.

10:46 20 Sorry, I'm in the wrong folder.

10:47 21 Okay. I'm going to mark as Exhibit 6 the photo
10:47 22 DSN 1052 (sic) from your file from a folder marked the
10:47 23 inspection photos December 7, 2023, EAG.

10:48 24 Is this the photo of the arc tick that you're
10:48 25 referring to?

STENO

10:48 1 A. That's an overall view. I would suggest going
10:48 2 to the next photo.

10:48 3 (Exhibit 034-0006 marked.)

10:48 4 BY MR. BRISCO:

10:48 5 Q. Okay. Next photo in order would be DSN 1053.
10:48 6 The shared screen version, it's easier to get on the same
10:48 7 page. All right, sir, I'm showing you the next photo in
10:48 8 line DSCN 1053. Is this the same line but zoomed in?

10:48 9 A. Yes.

10:48 10 Q. Okay. Does this show the arc tick you're
10:48 11 referring to?

10:48 12 A. It -- it does, but it also shows the mechanical
10:48 13 damage. As I recall --

10:48 14 Q. (Unintelligible) --

10:48 15 A. -- if you go to the next photograph, it may
10:49 16 be --

10:49 17 Q. DSCN 1054, sir, on the screen?

10:49 18 A. Yes. You see those little areas of molten
10:49 19 metal?

10:49 20 Q. I'm going to have you mark them for me here
10:49 21 after I add this as an exhibit, but tell me what's
10:49 22 relevant to the area of the molten metal on this photo
10:49 23 DSCN 1054 from Item Number 2?

10:49 24 A. Well, right in the middle you see a small arc
10:49 25 tick, arc mark.

STENO

10:49 1 Q. Uh-huh. I'm going to introduce this same photo
10:49 2 as Exhibit 7. Okay. Now, you should be able to see it,
10:50 3 sir, and we are going to do some marking today on
10:50 4 exhibits. So I wanted to give you the ability to
10:50 5 annotate and I'm --

10:50 6 (Exhibit 034-0007 marked.)

10:50 7 MR. MCCULLOUGH: Mr. Brisco, this is Greg
10:50 8 McCullough. If you would like the witness to annotate
10:50 9 you need to have him present --

10:50 10 MR. BRISCO: Oh, I see.

10:50 11 MR. MCCULLOUGH: -- and then he's able to
10:50 12 annotate.

10:50 13 MR. BRISCO: So I'll shop share on my end.
10:50 14 Thank you for that tip.

10:50 15 BY MR. BRISCO:

10:50 16 Q. Sir, are you able to see on your screen on the
10:50 17 right side a list of the marked exhibits in this case?

10:50 18 A. Yes.

10:50 19 Q. Okay. The top one I believe should be the
10:51 20 Exhibit 7 that we were just referencing, Photo DSCN 1054.
10:51 21 Do you see that?

10:51 22 A. Yes. Well, I see the Exhibit 7.

10:51 23 Q. Okay. And, Greg, feel free to interrupt me if
10:51 24 you can give better direction to him, but if you click on
10:51 25 the --

STENO

10:51 1 MR. MCCULLOUGH: I can do that.

10:51 2 Sir, if you click on the word present to the
10:51 3 right of the seven, that should share the exhibit from
10:51 4 your screen.

10:51 5 THE WITNESS: I did that and something is
10:51 6 popping up, yes.

10:51 7 MR. MCCULLOUGH: Yes. And now, if you click on
10:51 8 the pencil that's on the toolbar three quarters of the
10:51 9 way on the right --

10:51 10 THE WITNESS: Yeah.

10:51 11 MR. MCCULLOUGH: -- click on that. You will
10:51 12 have the ability to -- you should have the ability to
10:52 13 draw now.

10:52 14 BY MR. BRISCO:

10:52 15 Q. It looks like there's a paint brush there.

10:52 16 You're quicker than I am, sir. So you just
10:52 17 made a circle of what, sir?

10:52 18 A. That looks like an arc tick.

10:52 19 Q. Okay. So on Exhibit 7 you've circled what
10:52 20 looks like the arc tick that we've been discussing so far
10:52 21 in this case on Item Number 2?

10:52 22 A. Yes.

10:52 23 MR. SIMON: This is Craig.

10:52 24 Are there other arc ticks that he can circle.

10:52 25 THE WITNESS: You know, there may be, Craig.

STENO

10:52 1 Maybe go to the next photo.

10:52 2 BY MR. BRISCO:

10:52 3 Q. Okay. I think this means you've got to now
10:52 4 stop presenting on your side.

10:52 5 MR. MCCULLOUGH: Before you do, could you
10:52 6 please click save annotated exhibit in the top right-hand
10:52 7 corner.

10:52 8 THE WITNESS: Done.

10:52 9 MR. MCCULLOUGH: And then type in 034-007 --

10:53 10 THE WITNESS: And save again?

10:53 11 MR. MCCULLOUGH: No, if you can -- yeah, we'll
10:53 12 correct it later then. Thank you. What is currently 034
10:53 13 will be marked as 034-0007-A.

10:53 14 MR. BRISCO: Perfect. Thank you, Mr.
10:53 15 McCullough.

10:53 16 (Exhibit 034-0007-A marked.)

10:53 17 BY MR. BRISCO:

10:53 18 Q. And now, if you can hit stop presenting on your
10:53 19 screen, Dr. Fowler.

10:53 20 All right. I appreciate you working with us on
10:53 21 the technology here. I'm going to share my screen again,
10:53 22 which is that same Exhibit 7 photograph, and I'll go to
10:53 23 the next in order. And it looks like from there we --

10:53 24 A. We moved on to something else. So if you back
10:53 25 up, it looks like there's some other very small arc

STENO

10:53 1 ticks. On the right side of that photo, yes.

10:54 2 BY MR. BRISCO:

10:54 3 Q. Okay?

10:54 4 A. Where your cursor is.

10:54 5 Q. Yep, this area?

10:54 6 A. Yeah. And maybe even to the right a little bit
10:54 7 more.

10:54 8 Q. Okay. Then let's go through our exercise
10:54 9 again, because I want to be able to document with you the
10:54 10 areas you see the arc tick on this particular location.
10:54 11 So I do need you to click on the Exhibit 7 again and draw
10:54 12 for us again the other areas you see the arc ticks.

10:54 13 A. You know, I just have to tell you, the image
10:54 14 when you bring up Exhibit 7 isn't quite as clear as the
10:54 15 original photographs, but that looks like the area we
10:55 16 were looking at, the other photographs.

10:55 17 And I should also point out, you see the, sort
10:55 18 of the shiny areas on tops of the strands?

10:55 19 Q. Yes, sir.

10:55 20 A. My notes also reflect mechanical damage in that
10:55 21 area.

10:55 22 Q. And do you have an opinion as to what would
10:55 23 have caused that mechanical damage?

10:55 24 A. Well, it was most likely handling after the
10:55 25 fire, maybe during a recovery of the conductor.

STENO

10:55 1 Q. Okay. Let me make sure I properly documented
10:55 2 this exhibit. This is still Exhibit 7-A, but now with a
10:55 3 new oval shaped mark on the right side that you did for
10:55 4 us, marking the location of additional arc ticks on this
10:55 5 Exhibit 7-A; is that correct, sir?

10:55 6 A. Yes.

10:55 7 Q. Okay. And you can go ahead and hit save
10:56 8 annotated.

10:56 9 A. Done.

10:56 10 Q. Yeah.

10:56 11 MR. SIMON: Put in the full exhibit number if
10:56 12 you can all the way to the digit.

10:56 13 BY MR. BRISCO:

10:56 14 Q. So if you type in 034, sir, that's your witness
10:56 15 number, and then after typing in 034 -- you have to back
10:56 16 up.

10:56 17 A. Wait a minute.

10:56 18 Q. Now you type in a dash, 0007, and then an A.
10:56 19 Perfect. Now hit save. Perfect. And you can stop
10:56 20 presenting.

10:56 21 And just to clarify, so the arc ticks that you
10:56 22 circled for us on Exhibit 7-A, those are the arc ticks we
10:56 23 discussed earlier when we talked about this energized
10:57 24 Item Number 2 contacting the ground. And that's an arc
10:57 25 tick that potentially could have been caused by contact

STENO

10:57 1 with the ground, correct?

10:57 2 A. Potentially, yes.

10:57 3 Q. Okay. I'm going to share my screen and show
10:57 4 you -- you had a chance to review the PowerPoint that was
10:57 5 part of Dr. Kumar's deposition?

10:57 6 A. Okay.

10:57 7 Q. Right, you reviewed the PowerPoint, correct?

10:57 8 A. Yes.

10:57 9 Q. Okay. Actually, I don't remember what the
10:57 10 PowerPoint was marked on Dr. Kumar's deposition. We'll
10:57 11 attach it later to yours, but I'll mark it as Exhibit 8
10:57 12 to your deposition, and I'll just refer to the slide
10:57 13 numbers.

10:57 14 Do you recognize this area depicted on Slide
10:57 15 159 of Dr. Kumar's PowerPoint, Exhibit 8 to your
10:58 16 deposition?

10:58 17 A. Yes.

10:58 18 (Exhibit 034-0008 marked.)

10:58 19 BY MR. BRISCO:

10:58 20 Q. Okay. And I can't see the way it looks on your
10:58 21 screen, so if you need me to zoom in let me know.

10:58 22 But what area are we looking at here?

10:58 23 A. You're looking at Item 2 that is 15 feet ten
10:58 24 inches to 16 feet four inches from the reference cut.

10:58 25 Q. Okay. How far is this from the failure

STENO

10:58 1 location on Item 2?

10:58 2 A. Well, it's at the location of separation, and
10:58 3 what you have to realize is that in one location there
10:59 4 were three strands that separated, and in another
10:59 5 location there were four strands. So I believe the 16.4
10:59 6 is the three-strand location, and I can probably --
10:59 7 there's another slide where he shows an overall view of
10:59 8 where this was taken.

10:59 9 Q. Gotcha. I follow you.

10:59 10 If you want to find that slide, that's fine,
10:59 11 for -- I'm not trying to cut you off, but I follow where
10:59 12 you're at.

10:59 13 A. Well, there's 200 slides. If you want to take
10:59 14 the time I will, but if that answer suffices. You see
10:59 15 the caption, side-view of three failed aluminum strands
11:00 16 and arcing?

11:00 17 Q. Yes.

11:00 18 A. Yeah. So this is -- this is Item 2 on the
11:00 19 three-strand area of separation.

11:00 20 Q. Right.

11:00 21 A. And all I'm saying, for those that want an
11:00 22 overall view, I believe there's a slide that shows that.

11:00 23 Q. If you know that slide number handy, that's
11:00 24 fine. I'd be happy to hear it. Otherwise, I won't take
11:00 25 your time to have you search for it.

STENO

11:00 1 A. Well, I'll tell you what I know better is --
11:00 2 are the -- I made some enlargements that were scanned and
11:00 3 produced as part of my file. And one of the enlargements
11:00 4 shows both ends together, but as long as you know what
11:01 5 we're looking at, I'm fine.

11:01 6 Q. No, that's fine. What I'm trying to get is
11:01 7 where this location is in relation to the arc ticks you
11:01 8 circled for us in Exhibit 7-A, and I believe -- and so
11:01 9 can you give me a distance from the arc ticks
11:01 10 approximately that this Slide 159 image is located at?

11:01 11 A. You'd have to add a foot -- and actually, one
11:01 12 foot, four inches --

11:01 13 Q. Uh-huh.

11:01 14 A. -- to the note I referred to previously. It
11:01 15 shows the arc tick about in the middle between zero and
11:01 16 15 feet.

11:01 17 Q. Right.

11:01 18 A. So if you take that to be seven and a half and
11:01 19 this a foot and a half, it would be about nine feet away.

11:02 20 Q. Gotcha.

11:02 21 And it being nine feet away is -- this location
11:02 22 is nine feet away from the arc tick location but closer
11:02 23 to the failure point; is that correct?

11:02 24 A. I'm not certain I know what you're asking with
11:02 25 that request.

STENO

11:02 1 Q. Sure.

11:02 2 So your --

11:02 3 A. You asked the distance between the arc tick and

11:02 4 what we're looking at, at least because we're looking

11:02 5 over a range here --

11:02 6 Q. Right.

11:02 7 A. -- at 16.4 and that's about nine feet away.

11:02 8 Q. Right. The arc tick is about nine feet away

11:02 9 from this location, correct?

11:02 10 A. Approximately.

11:02 11 Q. Okay. And this area that we're looking at in

11:02 12 Slide 159 is closer to the failure location; is that

11:02 13 correct?

11:02 14 A. Well, this -- this is the failure location, but

11:03 15 let me tell you what -- what's been done and -- for ease

11:03 16 of discussion I believe both Dr. Kumar and I have -- if

11:03 17 we're using a single dimension, it's referring to the

11:03 18 four aluminum strands in the core strand that's

11:03 19 separated, and that's at 17 feet.

11:03 20 Q. Gotcha.

11:03 21 A. And this is eight inches away from that.

11:03 22 Q. Gotcha.

11:03 23 A. So again, for brevity, we've just referred to a

11:03 24 single location at 17 feet, and there's an overall view

11:04 25 that shows the relationship between Item 1 and Item 2 and

STENO

11:04 1 where this is located in relation to 17 feet.

11:04 2 Q. Okay. You agree that both the area of the arc
11:04 3 tick that you identified in Exhibit 7-A and this area
11:04 4 we're seeing on Photo 159, both areas of the conductor
11:04 5 were in contact with the ground after separation,
11:04 6 correct?

11:04 7 A. Item 2 is in contact with the ground and Item 1
11:04 8 was in contact with the parking lot, which you could also
11:04 9 call the ground.

11:04 10 Q. Right, a softball question, but both the area
11:04 11 we're looking at on 159 and the Exhibit 7-A area you
11:04 12 showed us, both of those are laying on the ground about
11:05 13 nine feet apart from each other, correct?

11:05 14 A. Wait. When you say both of them you mean the
11:05 15 arc tick and the severed end, the separated end?

11:05 16 Q. Correct, yes, exactly. Both the -- both
11:05 17 photographs we're looking at are two areas of the
11:05 18 conductor, Item 2, that are just lying on the ground
11:05 19 after separation.

11:05 20 A. Yeah, that's correct. But don't forget that
11:05 21 there's damage that is eight inches away from this area
11:05 22 and that's the reference area, 17 feet. And all that is
11:05 23 laying on the ground afterwards.

11:05 24 Q. Sure. There's other areas laying on the ground
11:05 25 afterwards, correct?

STENO

11:05 1 A. Well, you can -- you can tell the portion of
11:05 2 the conductor based on the discoloration that was clearly
11:05 3 on the ground.

11:05 4 Q. Right. So I didn't mean to spend so long on
11:05 5 just identifying where this is located, but I just wanted
11:06 6 to simply confirm we're on the same page, that this is
11:06 7 another area that's lying on the ground. But let me move
11:06 8 on to my question, is, what is it that you believe
11:06 9 caused -- well, strike that.

11:06 10 What would you describe this blob of material
11:06 11 here we see in Slide 159?

11:06 12 A. It's molten aluminum.

11:06 13 Q. So what do you believe caused that molten
11:06 14 aluminum?

11:06 15 A. Conductor clashing.

11:06 16 Q. Why do you believe that's caused by conductor
11:06 17 clashing?

11:06 18 A. Well, you have to start with the north phase
11:06 19 conductor coming down, and what caused it to come down
11:06 20 was extensive melting associated with the conductor
11:06 21 clashing. And then when you look at the mating north
11:07 22 conductor, you see in this area is the most significant
11:07 23 damage on the north conductor -- sorry, on the center
11:07 24 conductor.

11:07 25 And then you add that with the phase to phase
STENO

11:07 1 fault that was part of the recloser data, then they all
11:07 2 tie together very nicely.

11:07 3 Q. Let's -- yeah. I want to ask you a couple
11:07 4 questions about why you think that is conductor clashing
11:07 5 in that photo. But before -- before we do that, let's
11:07 6 take a step back then and have you explain to me the
11:07 7 sequence of events that occurred in this case with the
11:07 8 north phase conductor coming down?

11:07 9 A. Okay. The north and center phase experienced
11:08 10 conductor clash or clashing that were rather significant
11:08 11 arcs that melted multiple areas on both conductors. The
11:08 12 core strand at location 17 feet melted through or it
11:08 13 mostly melted through. And the core strand is what
11:08 14 really provides the strength for the ACSR conductor, and
11:08 15 when that melted then the one portion that's labeled
11:08 16 Item 1 fell to the parking lot, where it appears to have
11:08 17 experienced some mechanical damage.

11:08 18 And Item 2 that was attached to the west pole
11:08 19 fell to the ground. And then in addition to that, the
11:09 20 portion of Item 2 -- or maybe -- maybe I ought to -- we
11:09 21 need to include an Item 2 from the point of separation to
11:09 22 the west pole.

11:09 23 So the portion of Item 2 that was closer to the
11:09 24 west pole contacted the triplex and created arc damage,
11:09 25 and there was more arc damage on the north phase closer

STENO

11:09 1 to the west pole than what was observed on the triplex.
11:09 2 So I believe it's likely that it came in contact with
11:09 3 another grounded object, such as the guy wires, because
11:09 4 it was still above the ground. It wouldn't have
11:09 5 contacted the ground.

11:09 6 Q. I'm -- so if I follow the -- on its way down,
11:10 7 the Item Number 2, north phase conductor, hits the
11:10 8 service drop, making the mark we see on the service drop
11:10 9 about eight feet from pole two, and then as it continues
11:10 10 to fall also hits the guy wire making the additional
11:10 11 marks we see on Item Number 2?

11:10 12 A. Yeah. I think that's likely, but, you know, I
11:10 13 don't know if at that point a portion of the conductor is
11:10 14 already on the ground, but it would appear to be moving
11:10 15 and contacting the grounded conductor or guy wire or
11:10 16 another ground object. I mean, I -- I can't tell you
11:10 17 precisely. All I know is the guy wire is in the area
11:10 18 where there was other arcing --

11:10 19 Q. Okay.

11:10 20 A. -- on the north phase.

11:10 21 Q. I follow you.

11:10 22 Sir, did you read the deposition of Victoria
11:11 23 Victor?

11:11 24 A. Yes.

11:11 25 Q. Okay. And do you believe that the north phase

STENO

11:11 1 Item Number 2 portion that came down, when it hits the
11:11 2 service drop, would that make sparks that are consistent
11:11 3 with what Victoria Victor observed as testified in her
11:11 4 deposition?

11:11 5 A. Well, my recollection is that she didn't see
11:11 6 any conductors down when she was describing what she saw.

11:11 7 Q. What I'm asking you is would that make -- that
11:11 8 contact from the north phase number two contacting the
11:11 9 service drop, would that contact emit sparks?

11:11 10 A. Yes.

11:11 11 Q. Okay. And would those sparks be located in a
11:11 12 similar area where Victoria Victor testified she observed
11:11 13 sparks on the day of the fire?

11:12 14 A. Well, I don't think I'm in a position to
11:12 15 analyze her testimony and respond to that question.

11:12 16 Q. Do you recall Victoria testifying that she saw
11:12 17 sparks at the top of the pole but couldn't tell if it was
11:12 18 the wire or the transformer?

11:12 19 A. I recall her talking about the transformer, but
11:12 20 I also recall her talking about the conductors being in
11:12 21 the air. And I also recall her talking about the timing,
11:12 22 which doesn't match with the, at least the recloser data,
11:12 23 where there was a recorded phase to phase, and I believe
11:12 24 three phase to ground recordings.

11:12 25 Q. Are you going to be providing any opinions

STENO

11:12 1 regarding the start time of the fire in this case?

11:12 2 A. No.

11:12 3 Q. Okay. Are you relying on the time of Victoria
11:13 4 Victor's observations for your opinion in this case?

11:13 5 A. The answer is no, I haven't analyzed her
11:13 6 testimony. You asked me about her, so I pointed out the
11:13 7 inconsistencies between her testimony and at least the
11:13 8 recloser data. In other words, she saw the arcing and
11:13 9 presumably the fire before the recloser data indicates
11:13 10 there was arcing or phase to phase fault or phase to
11:13 11 ground fault.

11:13 12 Q. And what makes you believe she saw the arcing
11:13 13 before there was a phase to phase or phase to ground
11:13 14 fault?

11:13 15 A. Well, we know the timing of the phase to phase
11:13 16 and phase to ground faults, and I believe she provided a
11:14 17 time that preceded that.

11:14 18 Q. And do you have any information as to what
11:14 19 Victoria Victor based her time of her observations on?

11:14 20 A. Whatever she said in her testimony.

11:14 21 Q. You don't recall as you sit here today, fair?

11:14 22 A. There was something about a Ring video, but
11:14 23 it's been awhile since I reviewed her testimony.

11:14 24 Q. Sure. Do you recall Victoria Victor testifying
11:14 25 that she had no concept of time?

STENO

11:14 1 A. Not specifically.

11:14 2 Q. What was the time that you said the phase to
11:14 3 phase fault and phase to ground fault occurred?

11:14 4 A. I'd have to go back and look at her testimony.
11:14 5 All I remember is that it was before the recloser.

11:14 6 Q. I apologize, yeah. I was asking -- you
11:14 7 referenced the recloser data and the time of the phase to
11:14 8 phase and phase to ground fault.

11:15 9 Do you know that time?

11:15 10 A. Oh, I'm sorry, is that what you asked?

11:15 11 Q. Yeah, sorry. That's what I intended to ask,
11:15 12 but I don't know if I did a good job of it or not.

11:15 13 A. My apologies. 11:55 a.m., approximately, when
11:15 14 there was a phase to phase fault. But I need to tell you
11:15 15 Don Russell would have the exact time.

11:15 16 Q. Sure. But the approximate time of the phase to
11:15 17 phase fault was 11:55 a.m.?

11:15 18 A. That's my understanding based on a discussion
11:15 19 with Don Russell.

11:15 20 Q. Okay. How about the phase to ground fault?

11:15 21 A. That followed it but shortly after.

11:15 22 Q. Okay. If Victoria Victor's observations were
11:15 23 at 11:55 a.m., her observations being sparks towards the
11:15 24 top of pole two, would those observations be consistent
11:15 25 with a phase to service drop contact as you discussed

STENO

11:16 1 earlier?

11:16 2 A. I don't know. That's beyond the scope of
11:16 3 anything I evaluated.

11:16 4 Q. Do you know what else in the area of pole two
11:16 5 could have caused the sparks she saw at the top of pole
11:16 6 two?

11:16 7 A. The answer is no but I don't believe it was the
11:16 8 transformer.

11:16 9 Q. Okay. You inspected the transformer in this
11:16 10 case?

11:16 11 A. Yes, but it had been repaired by the time, or
11:16 12 at least serviced by the time I saw it.

11:16 13 Q. You saw the transformer during your
11:17 14 December 5th and 6th site inspection, 2023?

11:17 15 A. It was on December 6th.

11:17 16 Q. Okay. Where was the transformer located during
11:17 17 your December 6th, 2023, inspection?

11:17 18 A. At the Liberty facility in South Lake Tahoe.

11:17 19 Q. It had already been removed and placed into
11:17 20 evidence there?

11:17 21 A. Correct.

11:17 22 Q. Okay. Who was present for this inspection?

11:17 23 A. Russell, Krsto, Steven and Tom Fee.

11:17 24 Q. Okay.

11:17 25 A. And I was informed that the transformer from
STENO

11:17 1 the west pole had been refurbished in May of 2022, and
11:18 2 that a car hit the pole and they removed the transformer.

11:18 3 Q. So you were advised that a car hit pole two in
11:18 4 the May of 2022 and the transformer was replaced?

11:18 5 A. I don't have the date of the car impact. I
11:18 6 just was informed that it was refurbished in May of 2022.

11:18 7 Q. Can you -- I believe you testified you saw no
11:18 8 evidence on the transformer that the transformer was
11:18 9 involved in any way with sparking or arcing or
11:18 10 significant events on the day of the Mountain View fire?

11:18 11 A. Well, certainly there was none when I observed
11:18 12 it, and I'm not aware of any damage to the transformer.

11:18 13 Q. So if there's no damage to the transformer from
11:18 14 your observations and there is damage from the service --
11:19 15 the north phase conductor contacting the service drop,
11:19 16 which would have created sparks, is there anything else
11:19 17 that could have created sparks that Victoria Victor would
11:19 18 have seen up high at the top of pole two on the day of
11:19 19 the fire?

11:19 20 A. I don't know.

11:19 21 Q. Uh-huh.

11:19 22 A. I did not evaluate what she observed. I just
11:19 23 noticed that it was from a timing viewpoint her best
11:19 24 estimate of the time was inconsistent with the recloser
11:19 25 data.

STENO

11:19 1 Q. And so the only reason you believe her
11:19 2 observations are inconsistent with the recloser data, and
11:19 3 her observations being the north feed conductor
11:20 4 contacting the service drop, is simply you believe her
11:20 5 observations occurred before the phase to phase fault and
11:20 6 phase two service drop contact?

11:20 7 A. I believe she provided that testimony.

11:20 8 Q. Right. Did you understand her testimony is all
11:20 9 based upon her reference to her Ring camera video?

11:20 10 A. She mentioned that but I would have to go back
11:20 11 and review her testimony again. I don't recall, other
11:20 12 than generally where she was, generally her observations,
11:20 13 and generally the time that she gave.

11:20 14 Q. Okay. Thank you, sir.

11:20 15 I want to go back to asking you about this area
11:21 16 in Slide 159 on Dr. Kumar's PowerPoint, we'll mark it as
11:21 17 Exhibit 8 to your deposition. I believe you said that
11:21 18 the molten material and Slide 159 you said is caused by
11:21 19 phase to phase contact?

11:21 20 A. Yes.

11:21 21 Q. Okay. How do you know that it's caused by
11:21 22 phase to phase contact as opposed to the conductor
11:21 23 contacting the ground?

11:21 24 A. In my experience, because when you get ground
11:21 25 contact because the ground is a relatively poor conductor

STENO

11:21 1 and the photographs that I saw that were identified as
11:22 2 arc marks on the ground were on rocks, and also just my
11:22 3 experience of seeing conductor energized as fallen to the
11:22 4 ground, the arc marks are relatively small. The melting
11:22 5 you're seeing there is relatively large. I mean, it's --
11:22 6 it's much greater than I would assume --

11:22 7 Q. Okay. So the size of the molten blob here is
11:22 8 what tells you --

11:22 9 THE REPORTER: He's frozen, I believe.

11:23 10 (Discussion off the record.)

11:23 11 MR. BRISCO: You're on mute, Dr. Fowler. I
11:23 12 can't hear you now.

11:23 13 THE WITNESS: Sorry. How much did you not get?

11:23 14 MR. BRISCO: That's a good question. I don't
11:23 15 know. I'll tell you what I did get and we'll start over
11:23 16 again. Okay.

11:23 17 THE REPORTER: If you want me to read it, I
11:23 18 can.

11:23 19 MR. BRISCO: Please, Cheri, can you read back
11:23 20 the portion we got.

11:23 21 (The record was read as follows:

11:22 22 A I mean, it's -- it's much greater than I
11:22 23 would assume --)

11:22 24 THE REPORTER: But I don't think you were done
11:23 25 with that sentence, sir. Did that help at all?

STENO

11:23 1 THE WITNESS: Well, somewhat.

11:23 2 I mean, this is much greater than I would
11:23 3 expect with ground contact on the what looked like
11:23 4 volcanic rock that was on the ground.

11:23 5 BY MR. BRISCO:

11:23 6 Q. What do you mean by volcanic rock on the
11:24 7 ground?

11:24 8 A. Well, when I went out there it just looked like
11:24 9 there was gravel that was porous, and so I assumed it was
11:24 10 crushed up volcanic rock that had been deposited in the
11:24 11 field in that area.

11:24 12 Q. Oh, I see. I see. So -- so this conductor
11:24 13 had -- this section of the conductor we see in Slide 159
11:24 14 would have fallen into the field, but you believe there
11:24 15 would be pieces of gravel in the field. Is that what
11:24 16 you're saying?

11:24 17 A. Correct. And there are photographs taken
11:24 18 afterwards that show exactly where it landed.

11:24 19 Q. Right.

11:24 20 A. And where it landed is not where Cal-Fire
11:24 21 identified arc damage on the ground.

11:25 22 Q. Sure. No. I don't want to detour you too
11:25 23 much. I want to just understand why you believe this
11:25 24 particular blob in 159 is from contact with another
11:25 25 phase, as opposed to contact with the ground as it's

STENO

11:25 1 energized. And you talked a moment ago about the size of
11:25 2 this blob being much bigger than you would expect with
11:25 3 contact with the ground.

11:25 4 Any other reason you think this is not from
11:25 5 contact with the ground?

11:25 6 A. Well, I just identified -- I'm looking at
11:25 7 photographs now that show the end of the conductor, and
11:25 8 those are not the areas where the report identifies arc
11:25 9 burn on rock. So there was nothing from the field
11:25 10 investigation by Cal-Fire that put arcing, ground arcing
11:26 11 at this location.

11:26 12 And then the other reasons I've given to you.

11:26 13 Q. Sure. Can you get ground arcing by contacting
11:26 14 just the dirt, the ground, as opposed to those rocks?

11:26 15 A. Potentially, but in my experience live
11:26 16 conductors that have gone to the ground have relatively
11:26 17 low level arcing, more like what I identified in that
11:26 18 prior exhibit of that I said small ticks.

11:26 19 Q. Let me scroll down to another area not too far
11:26 20 away. I'm at Slide 165, on Dr. Kumar's Exhibit 8
11:27 21 PowerPoint, and I'll show 156 as well to you.

11:27 22 Can you still see my screen, sir?

11:27 23 A. Yes.

11:27 24 Q. Okay. And then 156 is more zoomed in on the
11:27 25 same photo of 165, but I'll go back to 165 for a little

STENO

11:27 1 better --

11:27 2 A. You're saying 165?

11:27 3 Q. Correct, sir.

11:27 4 A. Okay.

11:27 5 Q. Now, this is a different area than we were

11:27 6 looking at in Slide 159, correct?

11:27 7 A. Yes.

11:27 8 Q. Okay. And we see some more blobs here in

11:27 9 Slide 165, correct?

11:27 10 A. Yes.

11:27 11 Q. Okay. Also, another area of Item Number 2 that

11:27 12 would have been lying in the field after failure,

11:27 13 correct?

11:27 14 A. Correct.

11:27 15 Q. Okay. And same question as before. Do you

11:27 16 have an opinion as to what caused the blobs we see here

11:28 17 in Slide 165?

11:28 18 A. Conductor clash.

11:28 19 Q. Would this have been conductor clash on the day

11:28 20 of the fire?

11:28 21 A. That's the only time I'm aware of any conductor

11:28 22 clashing, but clearly it occurred on that day and brought

11:28 23 the north phase conductor down.

11:28 24 Q. Do you know how far the area depicted in

11:28 25 Slide 165 is from again the failure area on Item 2?

STENO

11:28 1 A. Yeah. Remember, we talked about the failure
11:28 2 area is actually in two locations.

11:28 3 Q. Yep.

11:28 4 A. But for a single reference we've been using
11:28 5 17 feet, where four aluminum and the core strands
11:28 6 separated, and it's really the core strand that has to go
11:29 7 to bring this down. So that's at 17 feet. So this would
11:29 8 be a foot and a half to two feet away.

11:29 9 Q. Okay. How is it that the line slap events --
11:29 10 well, strike that.

11:29 11 Did you also observe evidence of line slap
11:29 12 located at the exact point of failure?

11:29 13 A. Yes.

11:29 14 Q. Okay. How is it that the line slap you're
11:29 15 referring to that we see, these molten blobs of material
11:29 16 in Slides 165 and 159 that we just looked at, how was it
11:29 17 that those areas of line slap are contributing to the
11:29 18 line coming down, if at all?

11:29 19 A. Well, it didn't come down in this area.

11:30 20 Q. Right.

11:30 21 A. It just -- you create melting and -- and high
11:30 22 temperatures there that cause -- that severed some of the
11:30 23 strands.

11:30 24 Q. So the melting and severing of strands at the
11:30 25 locations we talked about on Slides 159 and 165, does

STENO

11:30 1 that create more weight on the remaining strands that are
11:30 2 holding up the conductors?

11:30 3 A. Well, yeah. You can -- probably ought to say
11:30 4 tension --

11:30 5 Q. Sure.

11:30 6 A. -- rather than weight.

11:30 7 Q. Sure.

11:30 8 A. It's really the core strand that's supporting
11:31 9 everything, and if the aluminum strands go then there's a
11:31 10 relatively modest increase in the tension in that area.
11:31 11 But, you know, it's -- all this happens very rapidly and
11:31 12 the damage is very rapid, but the conductor will likely
11:31 13 stay in the area until you melt or reduce the strength of
11:31 14 the core strand.

11:31 15 Q. Do you have an opinion as to how many line slap
11:31 16 events occurred before the core strand ultimately failed?

11:31 17 A. That's probably a question that maybe Don
11:31 18 Russell can answer. I'm -- I'm just aware of one phase
11:32 19 to phase contact, but, you know, he knows this recloser
11:32 20 data and the whole process very well. And there may be
11:32 21 other slaps that were not recorded, and that's a question
11:32 22 you have to ask him.

11:32 23 You know, metallurgically you see damage at the
11:32 24 same location, it's where you would expect it, meaning in
11:32 25 the middle third of the span. But he may be able to give

STENO

11:32 1 you a better answer if there could have been other line
11:32 2 slaps or not. I just don't know.

11:32 3 Q. Uh-huh. Let me get back to your Opinion 1. I
11:33 4 want to see if there's some stuff we haven't talked about
11:33 5 yet.

11:33 6 A. You know, you could -- well, we've covered a
11:33 7 lot more than just one, if you look at two, three and
11:33 8 four we've covered a lot of that.

11:33 9 Q. No. I have sense that we'll zip through some
11:33 10 of the others as we get there. I just didn't want to
11:33 11 leave one fully if there was more discussion to have. So
11:33 12 I wanted to look back at it briefly and give me a moment
11:33 13 and see.

11:34 14 Do you have -- is there a particular photo
11:34 15 that -- in your file that references the evidence that
11:34 16 the actual failure area shows evidence of line slap?
11:34 17 We've been talking for awhile about other areas of line
11:34 18 slap, Slide 159 and 165, but the specific failure area,
11:34 19 is there a photo I can look at that -- or you --
11:34 20 demonstrates the line slap at the failure location?

11:34 21 A. I'm not certain I know what you're asking. Are
11:34 22 you talking about a side by side photo that shows both
11:35 23 conductors?

11:35 24 Q. Well, not necessarily. So what we saw in
11:35 25 slide --

STENO

11:35 1 A. You know what, you're breaking up a little.

11:35 2 Q. Thank you for letting me know, and certainly if

11:35 3 there's a question that I ask that you don't get --

11:35 4 A. I can't hear you now.

11:35 5 (Discussion off the record.)

11:35 6 THE VIDEOGRAPHER: Counsel, I can hear the

11:35 7 taking attorney just fine.

11:35 8 This is the videographer.

11:35 9 THE REPORTER: Yeah, it's Dr. Fowler. He was

11:35 10 freezing up. When he said he couldn't hear, he was the

11:35 11 one freezing up.

11:35 12 MR. BRISCO: Okay. How is it now, Dr. Fowler,

11:35 13 can you hear me okay now?

11:35 14 THE VIDEOGRAPHER: Do you want to go off the

11:35 15 record?

11:35 16 THE REPORTER: He's frozen.

11:35 17 MR. BRISCO: Yeah, let's go off the record.

11:35 18 We're about due for another short break. So let's take a

11:36 19 ten-minute break and then we'll keep going.

11:36 20 THE VIDEOGRAPHER: The time is 11:35 a.m. We

11:36 21 are off the record.

11:50 22 (A recess was taken.)

11:50 23 THE VIDEOGRAPHER: The time is 11:50 a.m. We

11:51 24 are back on the record.

25 ///

STENO

11:51 1 BY MR. BRISCO:

11:51 2 Q. Dr. Fowler, looking at the fourth bullet point
11:51 3 on Opinion 1, the Exhibit 3, it says the separated
11:51 4 strands, estimated to be about 50 by Dr. Kumar, on the
11:51 5 north and center conductors were all caused by arcing
11:51 6 during conductor clashing.

11:51 7 Are you of the opinion that all of the
11:51 8 separated strands referred to by Dr. Kumar occurred, when
11:51 9 you say conductor clashing, meaning on the day of the
11:51 10 fire, line slap occurring between the north and center
11:51 11 phase?

11:51 12 A. Well, I'll say generally, yes, because I'm not
11:51 13 aware of other phase to phase faults at this location.
11:51 14 But, you know, Don Russell has evaluated that.

11:52 15 Q. Okay. And so --

11:52 16 A. And may be able to provide a better timing.

11:52 17 Q. Okay. From the metallurgical standpoint do you
11:52 18 believe that those estimated 50 separated strands on the
11:52 19 north and center phase occurred by line slap on the day
11:52 20 of the fire as opposed to some other time?

11:52 21 A. Well, I thought you just asked that. I mean
11:52 22 metallurgically it doesn't give you a time stamp, and I'm
11:52 23 aware of conductor clashing on the day of the fire, and
11:52 24 maybe Dr. Russell can talk about the possibility or the
11:52 25 occurrence of conductor clash previously.

STENO

11:52 1 Q. I see. And so it's fair to say the absence of
11:52 2 any record or documentation showing line slap before the
11:52 3 fire causes you to believe that the 50 or so separated
11:53 4 strands where you see line slap, that occurred on the day
11:53 5 of the fire, and the -- your observations are consistent
11:53 6 with it occurring on the day of the fire?

11:53 7 A. I don't think I've -- can answer you better
11:53 8 than I have. I'm not aware of another conductor clash or
11:53 9 phase to phase fault. If there was a prior occasion
11:53 10 then, you know, that would allow for the possibility of
11:53 11 another time.

11:53 12 Q. Sure. Just as far as the information you have,
11:53 13 there's no other incident of a line slap besides the day
11:53 14 of the fire, that's all?

11:53 15 A. Correct.

11:53 16 Q. And the evidence that you see on the -- of
11:53 17 these 50 or so separations is consistent with a line
11:53 18 slapping, consistent with it occurring on the day of the
11:53 19 fire?

11:53 20 A. Yes. There's nothing metallurgically that
11:53 21 would say that it didn't.

11:54 22 Q. Gotcha.

11:54 23 And so when those 50 -- approximately 50 line
11:54 24 slap events occurred --

11:54 25 A. Hold on. Hold on.

STENO

11:54 1 Q. Please.

11:54 2 A. You're going from 50 wires to 50 line slaps.

11:54 3 Q. Okay. So correct me. Are you saying that with
11:54 4 each line slap multiple fractures could occur?

11:54 5 A. Absolutely. And not necessarily fractures.
11:54 6 Multiple strands could get severed.

11:54 7 Q. Uh-huh.

11:54 8 A. And it could either be by melting, incipient
11:54 9 melting, high temperature fracture.

11:54 10 Now, I'll just emphasize again, Don Russell
11:54 11 understands recloser data and he may say, well, you could
11:54 12 have had additional contact and it wouldn't register on
11:55 13 the recloser. You really have to have his input on that
11:55 14 issue.

11:55 15 Q. Okay. I follow.

11:55 16 From a metallurgical standpoint when a line
11:55 17 slap event occurs it's going to drop molten globules of
11:55 18 metal on to the ground; is that correct?

11:55 19 A. Well, there's that potential for that because
11:55 20 you have melting, but I believe they did not find any on
11:55 21 the ground. As I recall, they looked and didn't find
11:55 22 any.

11:55 23 Q. Is that unusual to not find any?

11:55 24 A. Well, there can be -- there were plenty of
11:55 25 occasions where they found particles and we've analyzed

STENO

11:55 1 them.

11:55 2 Q. Okay. Is it possible that any of the molten
11:56 3 globules vaporized before they hit the ground?

11:56 4 A. Well, some of the aluminum vaporized, but the
11:56 5 particles that are ejected should remain as particles.

11:56 6 Q. Okay.

11:56 7 A. In other words, they're at a relatively low
11:56 8 temperature and should remain as particles.

11:56 9 Q. Okay. Is aluminum ferrous, such that it would
11:56 10 be picked up by a metal detector?

11:56 11 A. No.

11:56 12 Q. So is it fair to say that molten globules could
11:56 13 have fallen to the ground and not just been picked up by
11:56 14 a metal detector?

11:56 15 A. I don't know. I'm not going to speculate.

11:56 16 Q. It's possible?

11:56 17 A. I don't know.

11:56 18 Q. Sir, do you have an opinion as to how the
11:56 19 Mountain View fire started?

11:57 20 A. No.

11:57 21 Q. In your conversations with defendants' other
11:57 22 experts, Mr. Russell, Mr. Fee or anyone else, did any
11:57 23 other experts share with you an opinion as to how the
11:57 24 Mountain View fire started?

11:57 25 A. Not that I recall.

STENO

11:57 1 Q. Did Dr. Russell share with you any opinions in
11:57 2 this case?

11:57 3 A. Yes, about the recloser data.

11:57 4 Q. And what about the recloser data?

11:57 5 A. Well, we've pretty much spoken about it.

11:57 6 Q. About the timing of the faults, the 11:55 a.m.
11:57 7 phase to phase fault?

11:57 8 A. Yes. And that's an approximate time. He'll
11:57 9 give you the precise time.

11:57 10 Q. No. I want to make sure you were sharing --
11:58 11 we're on the same page as to what information you have on
11:58 12 Russell's opinions.

11:58 13 How about Tom Fee, did Tom Fee share any
11:58 14 opinions with you?

11:58 15 A. Not that I recall.

11:58 16 Q. So you have no idea what Tom Fee will opine in
11:58 17 this case?

11:58 18 A. I do not.

11:58 19 MR. SIMON: David, this is Craig.

11:58 20 Can you ask the same questions about counsel,
11:58 21 because you limited your question to experts?

11:58 22 MR. BRISCO: Yeah, that's fair.

11:58 23 BY MR. BRISCO:

11:58 24 Q. Did Counsel for Liberty share with you any of
11:58 25 its expert opinions in this case?

STENO

11:58 1 A. Not that I recall.

11:58 2 Q. Did Counsel share with you any other opinions
11:58 3 in this case instead of what caused the fire?

11:58 4 A. I know there was some discussion because of the
11:58 5 roof panel that was found on the other side of the field,
11:58 6 and there were some discussions about flying debris. But
11:58 7 there were more discussions rather than opinions.

11:59 8 Q. Okay. And what was discussed regarding flying
11:59 9 debris?

11:59 10 A. Well, that if it were to contact a conductor it
11:59 11 could potentially displace the conductor.

11:59 12 Q. Okay. Are you of the opinion that a flying
11:59 13 piece of metal brought down the conductor in this case?

11:59 14 A. No. I examined the roof panel and didn't find
11:59 15 evidence on it that I could tie it back to contact with
11:59 16 these conductors.

11:59 17 Q. Okay. How about a branch or any other object?

11:59 18 A. You know, I just didn't see evidence to support
11:59 19 that.

11:59 20 Q. Okay.

11:59 21 (Discussion off the record.)

11:59 22 MR. SIMON: Are you guys interested in taking a
12:00 23 little bit longer and grabbing a bite to eat?

12:00 24 MR. BRISCO: Yeah, you want -- that's fine. Do
12:00 25 you want -- I don't know if I caught the court reporter

STENO

12:00 1 on that. But I don't know where you're at, what you
12:00 2 have, if you have a sandwich nearby, sir?
12:00 3 THE VIDEOGRAPHER: Do you want to go off the
12:00 4 record?
12:00 5 MR. BRISCO: Yeah, let's the go off the record.
12:00 6 I thought --
12:00 7 THE VIDEOGRAPHER: The time is 11:59 a.m. We
12:00 8 are off the record.
12:01 9 (Brief recess.)
12:01 10 THE VIDEOGRAPHER: The time is 12 o'clock p.m.
12:01 11 We are back on the record.
12:01 12 BY MR. BRISCO:
12:01 13 Q. Okay. I'm looking at your Exhibit 3 opinions
12:01 14 list again. I'm on to Opinion 2. It says the west end
12:01 15 of the north conductor fell to the ground and was
12:01 16 discolored due to the ground fire. Sir, is that the --
12:01 17 is that a ground fire caused by the -- either the line
12:01 18 slap or the conductor to the ground?
12:02 19 A. I don't know. I didn't address fire cause or
12:02 20 origin.
12:02 21 Q. Okay. So you're just saying there that the
12:02 22 conductor -- north conductor was discolored due to the
12:02 23 ground fire, but whether or not it was a ground fire
12:02 24 caused by that same conductor, you don't know?
12:02 25 A. Correct.

STENO

12:02 1 Q. And it says the north conductor contacted the
12:02 2 triplex attached to the west pole and arced with the
12:02 3 neutral wire approximately 8 feet from the end of the
12:02 4 triplex. There were multiple arc marks on the north
12:02 5 conductor between 9.5 to 20.5 feet from the cut end of
12:02 6 the west pole, indicating additional contact with a
12:03 7 grounded object, such as the guy wire.

12:03 8 I believe we've already talked about the
12:03 9 sequence of events earlier, sir. Anything we haven't
12:03 10 talked about today regarding the basis for this
12:03 11 Opinion 2?

12:03 12 A. Well, we've covered it, if that's what you're
12:03 13 asking. But the basis is my examination of the evidence.

12:03 14 Q. Sure. And this two kind of -- there's a couple
12:03 15 different things going on with Opinion 2 here. Let me
12:03 16 start with that first sentence.

12:03 17 The discoloring due to the ground fire, can you
12:03 18 describe for me the discoloring you see on the north
12:03 19 conductor?

12:03 20 A. The darkish brown to black discoloration on the
12:03 21 conductor.

12:03 22 Q. Is there actual melting of the conductor from
12:04 23 being attacked by the fire or just dark brown
12:04 24 discoloration?

12:04 25 A. Just discoloration. I didn't observe any
STENO

12:04 1 melting associated with the ground fire.

12:04 2 Q. You agree a fire didn't cause this conductor to
12:04 3 come down, right, sir?

12:04 4 A. Not that I'm aware of.

12:04 5 Q. What portions of the conductor did you observe
12:04 6 having this dark brown discoloration due to the fire?

12:04 7 A. It was from the separated end going back
12:04 8 towards the west pole for a distance of about 12 feet
12:04 9 from the cut, which was not discolored.

12:04 10 Q. And so from the failed end to 12 feet from the
12:05 11 cut is discolored, and then once you hit 12 feet from the
12:05 12 cut there's no more discoloration from that 12 foot
12:05 13 location to the pole?

12:05 14 A. Well, to the cut end.

12:05 15 Q. And where is the cut end?

12:05 16 A. Well, you know, on the north phase they cut the
12:05 17 conductor near the bottom of the west and the east pole.
12:05 18 So the cut end would be near the bottom of the west pole,
12:05 19 realizing there's a photograph showing from the insulator
12:05 20 down along the side of the pole where they cut it, and
12:06 21 that was actually restrung with new conductor when they
12:06 22 put up the north phase.

12:06 23 Q. Okay. Do you believe there was no fire on the
12:06 24 ground by the conductor from the point of 12 feet from
12:06 25 the west of pole cut going towards the cut location at

STENO

12:07 1 the west pole?

12:07 2 A. Well, I gave you the factual observation on
12:07 3 that conductor at that location, but if you look at the
12:07 4 pole, you know, there's a clearing around the pole. So
12:07 5 given where the cut was, I believe the portion of the
12:07 6 north phase that was not discolored, that the clearing
12:07 7 didn't combust obviously, and so that end was not exposed
12:07 8 to the fire.

12:07 9 Q. Do you know how -- how many feet that clearance
12:07 10 is from the pole?

12:07 11 A. I didn't measure it specifically. I don't know
12:07 12 the precise measurement. You can see the relative
12:07 13 measurement in the photographs.

12:08 14 And actually, my notes say about 12 and a half
12:08 15 feet to the cut end. I've been saying 12 feet but...

12:08 16 Q. Best estimate was fine, sir.

12:08 17 A. Yeah. I thought it was but...

12:08 18 Q. Move on to Opinion 3, sir. It says, the east
12:08 19 end of the north conductor fell to the ground in a gravel
12:08 20 parking area and experienced mechanical damage.

12:09 21 Apparently numerous people had driven over the conductor,
12:09 22 citing the Pitch-man (phonetic) deposition.

12:09 23 What is the basis of your opinion that the
12:09 24 Item 1 -- is that what we're talking about here, sir,
12:09 25 Item 1?

STENO

12:09 1 A. Yes.

12:09 2 Q. So what's the basis for your opinion that
12:09 3 Item 1 experienced mechanical damage?

12:09 4 A. There was a relatively modest kink in the
12:09 5 conductor and there were abrasions on the conductor. And
12:09 6 there's a nice photograph of that kink, although it may
12:09 7 take awhile to find it in Dr. Kumar's slides, and that
12:09 8 kink was indicative of mechanical damage.

12:10 9 Q. When you say -- as we're looking for this, when
12:10 10 you say mechanical damage what -- describe for me what
12:10 11 you mean.

12:10 12 A. Well, a force applied to it where it deformed
12:10 13 it or being in a gravel parking lot and apparently being
12:10 14 run over, you produce abrasions.

12:10 15 Q. And that Item 1 conductor is not energized when
12:10 16 those abrasions occurred?

12:10 17 A. Correct.

12:10 18 Q. Okay. Because it already separated from
12:10 19 Item 2?

12:10 20 A. Correct.

12:10 21 Q. Do you recall where that kink location -- I
12:11 22 know you -- there's a lot of slides to go through and you
12:11 23 were trying to find it. Were you able to find it?

12:11 24 A. Well, I think there's two sets of photographs.
12:11 25 There's a -- and I'll find it because I saw it yesterday.

STENO

12:11 1 But there's a Cal-Fire photograph that shows the
12:12 2 conductor in the gravel lot, and that's around 178, 179.
12:12 3 And if you want me to find it in Dr. Kumar's slides that
12:12 4 will just take a minute.

12:12 5 Q. No, that's fine.

12:12 6 A. It's a very clear photograph that shows
12:12 7 mechanical damage that was mislabeled in the slide as
12:12 8 bird caging. And if I find it I'll bring you back to it.

12:13 9 Q. That sounds like a good plan. Let me share my
12:13 10 screen then while we're on Item 1. I'm looking at
12:13 11 Slide 14 of Dr. Kumar's PowerPoint Exhibit 8.

12:13 12 A. Yes.

12:13 13 Q. Do you see this here in Slide 14, the
12:13 14 separation of the aluminum strand and the black burn mark
12:13 15 on the strand just below the separation there?

12:13 16 A. Yes.

12:13 17 Q. Okay. What --

12:13 18 A. Which -- I'm sorry. Which slide?

12:13 19 Q. Slide 14.

12:14 20 You with me?

12:14 21 A. Yes.

12:14 22 Q. Okay. What caused this separation with the
12:14 23 black burn mark?

12:14 24 A. Arcing damage. There's melting in that area.

12:14 25 Q. And when we talked earlier about the -- one of
STENO

12:14 1 your opinions is that the areas of damage to the north
12:14 2 phase conductor strands that Dr. Kumar referenced is from
12:14 3 line slap. Do I have that right?

12:14 4 A. Would you repeat it, please.

12:14 5 Q. Sure. I'm just trying to understand if this is
12:14 6 one of the areas or an example of one of the areas that
12:14 7 you believe failed because of a line slap?

12:14 8 A. Yes.

12:14 9 Q. And you don't believe this was a fatigue
12:14 10 failure?

12:14 11 A. Absolutely not.

12:14 12 Q. And is this a parting arc that occurred at this
12:15 13 location?

12:15 14 A. No.

12:15 15 Q. Okay.

12:15 16 A. You know, you have a parallel path for
12:15 17 electricity through the other strands and you're not
12:15 18 going to get a parting arc. Let's say you have two wires
12:15 19 like this, any electricity that wants to flow through
12:15 20 that area would just do it through the other strands.
12:15 21 There is not a voltage differential between the two ends
12:15 22 of that wire.

12:15 23 Q. So do you believe the black mark we see here on
12:15 24 Slide 14 is caused by an arcing event from contact with
12:15 25 the center phase as opposed to a parting arc between the

STENO

12:15 1 two broken strands in the picture?

12:15 2 A. Yes.

12:15 3 Q. And what -- why is it from a line slap and not
12:16 4 from a parting arc?

12:16 5 A. Well, I just told you. Let's just say you cut
12:16 6 a piece of wire and you put it -- run current through it
12:16 7 at a certain voltage, the other strands have the ability
12:16 8 to carry the current. And the separated ends of an
12:16 9 individual strand, or in this case two strands, are in
12:16 10 intimate contact on both sides of that separation. So
12:16 11 there's an alternative parallel current path and there's
12:16 12 no voltage differential.

12:16 13 Q. So if this -- this strand in Slide 14 Exhibit 8
12:16 14 did experience a fatigue failure and accompanying parting
12:16 15 arc would you see this same type of black mark or no?

12:17 16 A. Well, the black mark is caused by a relatively
12:17 17 low level arcing at that location but, you know, you just
12:17 18 have to take your head for a moment out of what you see
12:17 19 up close or in the microscope and then back up to
12:17 20 consider other things like the strength of the conductor
12:17 21 to see if it's even possible to generate a fatigue crack.

12:17 22 If you did generate a fatigue crack where would
12:17 23 it likely occur, and you have to consider a parallel path
12:17 24 for the current to flow. So without a separation you
12:17 25 have five aluminum and one core strand, and it's mostly

STENO

12:18 1 the aluminum that will just pick up the flow on the
12:18 2 electricity. And as I said, you don't have a voltage
12:18 3 differential between the ends of the wire and you're not
12:18 4 going to get a parting arc or separation arc.

12:18 5 Q. You won't get a parting arc or a separation arc
12:18 6 when the aluminum strands break, is that what you're
12:18 7 saying?

12:18 8 A. Correct, in the context of this area that we're
12:18 9 talking about.

12:18 10 Q. Right. Right.

12:18 11 So the only way you can get this black mark
12:18 12 then is from the arc from contact with the center phase?

12:18 13 A. Well, it's either contact or very close
12:18 14 proximity, and Don Russell can talk to you about that.

12:19 15 Q. Understood. But if the -- if the strand had
12:19 16 separated, this aluminum strand we see in Slide 14,
12:19 17 you're saying you would not get a parting arc and
12:19 18 corresponding black mark there?

12:19 19 A. Correct. You don't have a separation, I've
12:19 20 explained at least twice know. You have a parallel
12:19 21 current path and you do not have a voltage differential.

12:19 22 Q. Okay. All right. Can you see Slide 15 here,
12:20 23 sir?

12:20 24 A. Yes.

12:20 25 Q. What would you describe for me is on the right
STENO

12:20 1 side on the tips of the two broken strands of aluminum
12:20 2 strands?

12:20 3 A. I'm sorry. Beginning of your question wasn't
12:20 4 clear. How did it start?

12:20 5 Q. Sure. Can you describe for me what we see here
12:20 6 at the tip of the broken aluminum strand?

12:20 7 A. The ends of the strands are melted due to
12:21 8 arcing.

12:21 9 Q. Okay. And is that a parting separation arc or
12:21 10 an arc from a line slap event?

12:21 11 A. Line slap.

12:21 12 Q. And how do you know that?

12:21 13 A. Well, for the same reason I just gave you at
12:21 14 the prior location.

12:21 15 Q. Which is that when the aluminum strands
12:21 16 separate a parting arc or separation arc is not
12:21 17 occurring?

12:21 18 A. Well, that, and you had a lot of arcing in that
12:21 19 area between the north phase and the center conductor.

12:21 20 Q. Okay. Sir, do you have any evidence of another
12:22 21 fire -- or strike that.

12:22 22 Do you have any evidence that the Mountain View
12:23 23 fire was caused by anything other than the north phase
12:23 24 conductor?

12:23 25 A. You know, I didn't do fire cause and origin, so
STENO

12:23 1 I'm not offering an opinion on what caused the Mountain
12:23 2 View fire.

12:23 3 Q. The only potential ignition source that you're
12:23 4 aware of in the area of the Mountain View fire origin is
12:23 5 the north phase conductor?

12:23 6 A. Well, I've studied the conductors. I didn't
12:23 7 determine whether that's an ignition source or not.

12:23 8 Q. Did you identify any other potential ignition
12:23 9 sources in the course of your examination in the area of
12:23 10 the Mountain View fire origin?

12:23 11 A. I didn't examine anything else other than the
12:23 12 roof panel, and I didn't see a connection between that
12:23 13 and the damage we're seeing on the conductors.

12:24 14 Q. Do you know what caused the fire that caused
12:24 15 the discoloration of the conductor you described in
12:24 16 Opinion 2?

12:24 17 A. Isn't that the same question?

12:24 18 Q. I don't know. I'm making sure I'm being
12:24 19 thorough here and not missing something, so...

12:24 20 A. Well, I'll give you the same answer.

12:24 21 Q. Which is you don't know what caused the fire?

12:24 22 A. I didn't do fire cause and origin.

12:24 23 Q. You know, why don't we -- I was contemplating
12:25 24 starting four, but we're so close to our lunch break,
12:25 25 sir, I don't want to just start and stop. So why don't

STENO

12:25 1 we take our lunch break now until 1 o'clock. Does that
12:25 2 sound good?

12:25 3 A. That sounds good.

12:25 4 Q. Thanks.

12:25 5 THE REPORTER: We're off the record.

12:25 6 THE VIDEOGRAPHER: The time is 12:24 p.m. We
12:25 7 are off the record.

12:25 8 Sorry about that.

13:03 9 (Lunch recess.)

13:03 10 THE VIDEOGRAPHER: The time is 1:03 p.m.

13:04 11 Pacific. We are back on the record.

13:04 12 BY MR. BRISCO:

13:04 13 Q. Dr. Fowler, just real quick want to fix some
13:04 14 terminology I was using for -- so far in the deposition,
13:04 15 make sure we're on the same page.

13:04 16 Item 1 and 2 are also referred to as the north
13:04 17 phase or north field side phase conductor prior to --
13:04 18 excuse me, let me strike that.

13:04 19 Item 1 and 2 are the separate pieces of the
13:04 20 north phase or also referred to as the north field side
13:04 21 phase conductor outside of the Mountain View Barbecue in
13:04 22 this case, correct?

13:04 23 A. Yes.

13:04 24 Q. And we sometimes use the term triplex or
13:04 25 service drop when talking about the service drop

STENO

13:05 1 connected to pole two that Item 2 had contacted on the
13:05 2 way down, and I just wanted to confirm with you, when you
13:05 3 say triplex you mean service drop or triplex is the same
13:05 4 line?

13:05 5 A. Correct.

13:05 6 Q. Just to clean up the record. Thanks, sir.

13:05 7 Let me move on to Opinion 4 on your list here
13:05 8 on Exhibit 3. It says multiple wires were melted and
13:05 9 fractured due to the heat generated during arcing when
13:05 10 the conductors clashed in the mid span area. Every
13:05 11 separated strand exhibits melting. The core stand at the
13:05 12 point of separation was melted. Multiple aluminum
13:05 13 strands exhibited melting, incipient melting and high
13:05 14 temperature fracture. The elevated temperature created
13:05 15 during arcing also causes oxidation on the fractured
13:06 16 surfaces.

13:06 17 Sir, what does the melting -- describe for me
13:06 18 how the melting is related to your opinion that the lines
13:06 19 slapped together at these locations?

13:06 20 A. Well, I thought I covered that but maybe you're
13:06 21 asking something different. I -- the purpose for saying
13:06 22 every separated strand exhibits melting, aside from being
13:06 23 factually true it also indicates elevated temperature at
13:06 24 that area that caused either gross melting, incipient
13:06 25 melting or some of it looks like high temperature

STENO

13:06 1 fracture.

13:06 2 And you have to also look at it in the context
13:07 3 of the opinion that all these wires separated due to
13:07 4 fatigue. And, you know, it's a little odd to think that
13:07 5 the only wires to exhibit or allegedly exhibit fatigue
13:07 6 also exhibited melting. I mean, if -- if fatigue was an
13:07 7 actual mechanism it wouldn't occur in mid span. It would
13:07 8 be out near the poles where the stresses are higher, and
13:07 9 you would probably have some wear associated with the
13:07 10 conductor before a strand became weakened enough to
13:07 11 actually fracture.

13:07 12 So I'm trying to tell you what did happen and
13:08 13 why it doesn't make -- this is just more information to
13:08 14 convey to you that it doesn't make any sense that you
13:08 15 would only have fatigue in the mid span, that every
13:08 16 fatigue fracture would exhibit melting. And then there's
13:08 17 more as you'll see in Opinion 5.

13:08 18 Q. Okay.

13:08 19 A. Correction, Opinion 6.

13:08 20 Q. So but on Opinion 4 that first bullet point
13:08 21 says every separated strand exhibits melting. Do you
13:08 22 mean every separated strand on both the north phase
13:08 23 conductor and the center phase conductor has melting?

13:08 24 A. Correct.

13:08 25 Q. And so that would include, at the failure

STENO

13:08 1 location, that would include the seven aluminum strands
13:08 2 on Item 1 on the east side pole?

13:08 3 A. Yes.

13:09 4 Q. Okay. And then as well as the steel core?

13:09 5 A. Correct. I have a special note there on the
13:09 6 steel core, because the metallography shows melting on
13:09 7 both ends.

13:09 8 Q. Okay. Let me -- let me ask you this way then.
13:09 9 I just want to get on the same page with you as to the
13:09 10 every strand shows melting part.

13:09 11 Let's see. Can you see the Slide 99 here?

13:09 12 A. Yes.

13:09 13 Q. Okay. This is --

13:09 14 A. What's the number? I can't see that detail.

13:09 15 Q. Oh, sure. It's Slide 99 of Kumar's PowerPoint
13:09 16 Exhibit 8.

13:09 17 This is the -- one of the strands of fractured
13:10 18 aluminum at the failure point but on the Item 1 side,
13:10 19 correct?

13:10 20 A. Correct.

13:10 21 Q. Okay. And is this an example that's kind of
13:10 22 bubbling of the fracture surface of this aluminum strand,
13:10 23 is that an example of the melting?

13:10 24 A. It is, but bubbles is not a term that I think
13:10 25 is the most accurate.

STENO

13:10 1 Q. Forgive me for the layperson term. What would
13:10 2 you call it?

13:10 3 A. Well, no, it's on the slide, but air bubbles
13:10 4 isn't the most technically appropriate term. But
13:10 5 they're -- they're really voids that formed during the
13:10 6 melting process and then this wire broke and the break is
13:11 7 through those voids.

13:11 8 Q. Okay. So I'll use your term, I want to be
13:11 9 correct with you. Void is the term I'll use.

13:11 10 Let me show you the other -- let me ask you
13:11 11 about the other strands from this same failure area.
13:11 12 Here is one of the -- this is Slide 97. Similar fracture
13:11 13 area but one of the neighboring strands in Item 1 at the
13:11 14 failure location?

13:11 15 A. Right.

13:11 16 Q. Okay. Agree we don't see the same bubbling or
13:11 17 to use your term void?

13:11 18 A. Right.

13:11 19 Q. Okay. So there is no melting at this location?

13:11 20 A. No. I believe this is an example of high
13:11 21 temperature fracture.

13:11 22 Q. But with no melting?

13:12 23 A. Well, you had a melting in that area that
13:12 24 created high temperatures, and this strand broke during
13:12 25 that process.

STENO

13:12 1 Q. Okay. And is there anything about the
13:12 2 characteristics of this image in Slide 97 that indicates
13:12 3 to you this was a line slap failure event?

13:12 4 A. Well, this is a too magnified view to really
13:12 5 conclude line slapping just from a view that's taken at
13:12 6 this magnification. I mean, that analysis comes from
13:12 7 looking at the span and then going down to microscopic
13:12 8 views.

13:12 9 But let me tell you what is not there, is
13:12 10 fatigue striations.

13:13 11 Q. And what does fatigue striations look like?

13:13 12 A. We should probably go to Opinion 6 and the
13:13 13 article that I included in my binder from the metals
13:13 14 handbook that is titled -- it's a section titled,
13:13 15 "Fatigue Fracture Appearance." And striations or beach
13:13 16 marks are the feature that is created during fatigue
13:13 17 crack growth. And there is not one separated end that
13:13 18 exhibits fatigue striations or beach marks. There's not
13:13 19 one mention of that anywhere in Dr. Kumar's lab notes or
13:14 20 his testimony.

13:14 21 Q. In your experience does arcing wipe away any
13:14 22 evidence of fatigue striations?

13:14 23 A. Did you say arcing?

13:14 24 Q. Yeah.

13:14 25 A. Well, it melts the metal, and so you've

STENO

13:14 1 destroyed that portion of the surface.

13:14 2 Q. Right. So if there were fatigue striations
13:14 3 taking place at an area where there was an arcing event
13:14 4 the arcing would wipe away the actual evidence of fatigue
13:14 5 striations?

13:14 6 A. Well, the arcing wipes away the evidence of
13:14 7 anything on the fracture surface.

13:14 8 Q. Right.

13:14 9 A. But then you go to the strength of the
13:14 10 conductor and ask yourself the question, how realistic is
13:14 11 it that you would have any fatigue in an aluminum strand.
13:15 12 And that's the section that is covered in seven. And
13:15 13 then where would you expect any damage to occur if it did
13:15 14 occur. And that's at the poles where the conductor goes
13:15 15 over the insulator.

13:15 16 And then you have to also integrate into your
13:15 17 thinking, gee, there's splices on both sides of the
13:15 18 separated area, which at least infers that a segment of
13:15 19 the conductor has been replaced, and therefore, is newer
13:15 20 than the conductors outside the splice. Then it would
13:15 21 show as any evidence of fatigue.

13:16 22 I mean, you -- I believe I understand what
13:16 23 happened here. And you see where the term flat fracture
13:16 24 is used?

13:16 25 Q. Yeah. Would you agree that is a flat fracture?

STENO

13:16 1 A. Yes. And all that means is, it does not show
13:16 2 distortion related with the fracture, but there are
13:16 3 multiple causes for flat fracture. If it's caused by
13:16 4 fatigue then you have to show that there is cycling
13:16 5 stresses that can be generated to create the fatigue at
13:16 6 this location and the fatigue would show up as a striated
13:16 7 appearance on the fracture surface.

13:16 8 There's no striations here. There's no beach
13:17 9 marks.

13:17 10 Q. But --
13:17 11 (Speaking simultaneously.)

13:17 12 THE WITNESS: -- as your temperature approaches
13:17 13 the melting temperature, then your ductility declines
13:17 14 rapidly and you get a flat fracture. And that's what you
13:17 15 have here.

13:17 16 BY MR. BRISCO:

13:17 17 Q. Okay. I appreciate that, sir. So a lot to
13:17 18 unpack. I appreciate there's a -- you're considering a
13:17 19 lot of things. So thank you for that. Let me unpack
13:17 20 some of this.

13:17 21 So you said this is, what we're looking at in
13:17 22 97, Slide 97 a flat fracture, correct?

13:17 23 A. You can call it a flat fracture. I certainly
13:17 24 understand the use of that word. It's not a term that I
13:17 25 would have selected for that appearance, but I understand

STENO

13:17 1 how the word is being used.

13:17 2 Q. Okay. And you don't see evidence of any
13:18 3 fatigue striations or beach marks on this flat fracture
13:18 4 surface, correct?

13:18 5 A. Correct. There were none present. There were
13:18 6 none identified.

13:18 7 Q. Now, if I --
13:18 8 (Speaking simultaneously.)

13:18 9 BY MR. BRISCO:

13:18 10 Q. -- but I think we agreed earlier, arcing would
13:18 11 wipe away any evidence of fatigue striation, correct?

13:18 12 A. Yeah, but look at what you're saying. You're
13:18 13 saying, oh, the fatigue striations used to be there, but
13:18 14 now the end is melted and it's gone away.

13:18 15 Q. I'm just taking it one step at a time.

13:18 16 A. Then what you're looking at is a melted end.

13:18 17 Q. Sir, the question was simply, does arcing wipe
13:18 18 away evidence of fatigue striations. That's it.

13:18 19 A. I've answered that.

13:18 20 Q. Yes, you did.

13:18 21 Let me show you -- let me show you another
13:18 22 photo then. We're still on the same location, another
13:18 23 aluminum strand end from the same failure location on
13:18 24 Item Number 1. Is this another flat fracture, sir?

13:19 25 A. Yes. You can call is a flat fracture. In

STENO

13:19 1 reality what it is, is a high temperature fracture where
13:19 2 the temperature is near the melting point of the
13:19 3 aluminum.

13:19 4 Q. But again, no -- no evidence of the void, the
13:19 5 bubbling, or as you termed it void in this Slide 110,
13:19 6 correct?

13:19 7 A. I don't see any in that photograph.

13:19 8 Q. Okay. How about Slide 113, yet another failed
13:19 9 aluminum strand in the failure area. No bubbling or
13:19 10 material void in that area?

13:19 11 A. I don't see any in that photograph, but that's
13:19 12 a high temperature fracture.

13:19 13 Q. Here's another one, 119, a different failed
13:19 14 aluminum strand in our same failure area from Item 1,
13:20 15 same question --

13:20 16 A. (Unintelligible) a high temperature fracture, I
13:20 17 just don't see voids there.

13:20 18 Q. Okay.

13:20 19 A. In fact, the photographs you're showing me
13:20 20 don't show microscopic detail, but that first photograph
13:20 21 showed very large voids that were obvious at this
13:20 22 magnification.

13:20 23 Q. Sure. So fair to say, other than one of the
13:20 24 aluminum strands in the failure area of the fractured
13:20 25 surfaces don't exhibit material void melting; is that

STENO

13:20 1 correct?

13:20 2 A. Wait a minute. You're -- voids is just another
13:20 3 artifact from a melting process. Adjacent to these wires
13:20 4 is plenty of evidence of melting, and that creates a high
13:20 5 temperature that led to the high temperature fractures
13:21 6 you've been showing me.

13:21 7 Q. Okay. I follow.

13:21 8 So you're saying adjacent to the strands
13:21 9 there's evidence of melting, but on the actual fracture
13:21 10 surface of the strands themselves, six out of the seven
13:21 11 aluminum strands don't show any material void melting,
13:21 12 correct?

13:21 13 A. Well, I'd have to go through all of them, but
13:21 14 some -- well, there's extensive melting in that area from
13:21 15 the arcing, but that melting had -- that heat has allowed
13:21 16 the aluminum strands to fracture.

13:21 17 Q. No. I understand that. I'm just -- I went
13:21 18 through each of them. That's why I was trying to show
13:21 19 you each aluminum strand in that area and there was only
13:21 20 one --

13:21 21 A. Back up one.

13:21 22 Q. Sure. Right here?

13:21 23 A. No. The one you zipped by, because that shows
13:21 24 more obvious melting.

13:21 25 Q. This -- where is that at?

STENO

13:21 1 A. Well, you see that rounded nodule on top?

13:22 2 Yeah. That's part of what's melted.

13:22 3 Q. Okay. So you're seeing material voids here

13:22 4 like we did with the prior bubbling slide?

13:22 5 A. Not at that location, no.

13:22 6 Q. Okay.

13:22 7 A. There were multiple aluminum strands that

13:22 8 showed the voids.

13:22 9 Q. Uh-huh.

13:22 10 A. And you have to go to other locations to

13:22 11 identify it, but the one you showed me had a lot of

13:22 12 voids.

13:22 13 Q. Yes. One of the -- I was showing you the seven

13:22 14 aluminum strands at the failure area on Item 1, and so

13:22 15 one of those seven aluminum strands had that bubbling

13:22 16 material void?

13:22 17 A. A lot of it, yes.

13:22 18 Q. The other ones I didn't see any. And I thought

13:22 19 I went one by one with you.

13:22 20 Did you see any on the other ones?

13:22 21 A. Not at those magnifications.

13:23 22 How about the core strand?

13:23 23 Q. Hold on, I'll get there. One thing at a time.

13:23 24 A. Okay.

13:23 25 Q. So I'm still on Opinion 4. I'm looking at the
STENO

13:23 1 last bullet point, the elevated temperature created
13:23 2 during arcing also caused oxidation on the fractured
13:23 3 surfaces.

13:24 4 A. Yes.

13:24 5 Q. So again, I think we're on the same page, but
13:24 6 we actually haven't talked about oxidation much today.
13:24 7 So can you describe for me oxidation and how it relates
13:24 8 to the arcing event you described?

13:24 9 A. Well, the arcing elevates the temperature of
13:24 10 the aluminum, and then when it fractures at high
13:24 11 temperature that hot metal will react with the oxygen in
13:24 12 the environment, and because it's at elevated temperature
13:24 13 it will oxidize rapidly.

13:24 14 Q. Do you look at the oxidation to -- the amount
13:24 15 much oxidation to tell you how old an arcing event was?

13:24 16 A. Well, we had that discussion earlier in the
13:24 17 deposition, and so in that context, yes, but that's
13:25 18 usually the outside of the arc area. This is directed
13:25 19 more towards the fracture surface, where there was
13:25 20 mention of oxidation on the fracture surface.

13:25 21 Q. Okay. Right. And did you see oxidation on the
13:25 22 fractured surface of the failed aluminum ends at the
13:25 23 failure area?

13:25 24 A. They are all going to be oxidized to a certain
13:25 25 extent.

STENO

13:25 1 Q. Right. But the fracture surface is going to
13:25 2 show more oxidation than the general surface area of the
13:25 3 aluminum strand, correct?

13:25 4 A. Well, the fracture surface represents
13:25 5 relatively fresh metal, and when it's hot it will
13:25 6 oxidize, whereas the side in a non-arc'd area will show
13:26 7 oxide that is formed over perhaps years. And that's
13:26 8 just -- it's a different oxide level and a different
13:26 9 appearance that provides some additional protection, even
13:26 10 at elevated temperatures. Less likely to change than
13:26 11 fresh metal is at elevated temperature.

13:26 12 Q. So forgive me, I got lost in your answer and
13:26 13 that's probably me.

13:26 14 So do you expect to see more or less oxidation
13:26 15 on the fracture surface of the failure area?

13:26 16 A. Just depends on how long that area remained
13:26 17 hot.

13:26 18 Q. Okay.

13:26 19 A. On the fresh metal you would expect to see some
13:26 20 level of oxidation, and on the piece that fell to the
13:27 21 ground that obviously saw fire or burning vegetation,
13:27 22 which really discolours that area.

13:27 23 Q. So, yeah, let's stay on Item 1 then, so we're
13:27 24 not in the field, we're in the gravel parking lot area,
13:27 25 fair?

STENO

13:27 1 A. Yes.

13:27 2 Q. So if you had an oxidation on -- well, strike
13:27 3 that.

13:27 4 If you had an arcing event that occurred a year
13:27 5 before the fire, would -- would you expect to see more
13:27 6 oxidation at that arc location than you would at an area
13:27 7 where that had an arcing event on the day of the fire?

13:27 8 A. Generally, yes. It's a matter of degree that
13:28 9 depends on the environment.

13:28 10 Q. Okay. How about an aluminum fracture that's
13:28 11 exposed to the atmosphere for a long period of time, is
13:28 12 that going to cause surface oxidation?

13:28 13 A. It can. The fracture itself doesn't cause the
13:29 14 oxidation. The fracture exposes metal that then is
13:29 15 exposed to the atmosphere.

13:29 16 Q. But does the fracture then have more oxidation
13:29 17 than the general surface of the remaining strand that's
13:29 18 always been exposed to the atmosphere?

13:29 19 A. Probably not as much, generally.

13:29 20 Q. Right. And why is that?

13:29 21 A. Because the exterior surface has had longer
13:29 22 exposure to the atmosphere.

13:29 23 Q. Is it also because the fracture surface
13:29 24 experienced an arcing event?

13:29 25 A. Wait, say that again?
STENO

13:29 1 Q. Sure. Is it also because the fracture surface
13:30 2 experienced an arcing event?

13:30 3 A. I'm not certain I understand. Are you talking
13:30 4 about the parting arc --

13:30 5 Q. Yeah.

13:30 6 A. -- what theory again?

13:30 7 Q. Well, any arc theory, right. So whether it's a
13:30 8 parting arc or a line slap arc, is that arc area going to
13:30 9 be -- experience more oxidation than other areas that
13:30 10 have no arcing evidence?

13:30 11 A. Well, I guess you have to identify different
13:30 12 appearances. What you see visually is usually a dull
13:30 13 gray appearance on the exterior of the strand, and then
13:30 14 in the area of arcing it actually seems a little bit
13:30 15 shinier or is a little bit shinier. When you look at
13:30 16 this in the electron microscope, you can see evidence of
13:30 17 oxidation on the high temperature fractures.

13:30 18 Now, is that as severe as the oxidation that's
13:31 19 on the exterior of the strand? Probably not because the
13:31 20 exterior of the strand has been exposed to longer
13:31 21 periods, but the fracture surface is exposed to elevated
13:31 22 temperatures, which accelerates the oxidation process.

13:31 23 Q. Let me go to Opinion 5 please there. It says,
13:31 24 Exhibit 3, the microstructure of the steel core at the
13:31 25 point of separation indicates local melting due to

STENO

13:31 1 arcing. The microstructure does not exhibit annealing or
13:31 2 recrystallization due to resistance heating. The change
13:31 3 in diameter at the point of separation is due to melting,
13:31 4 not tensile necking. A steel core at Item 1, 23 feet to
13:32 5 23 feet four inches was melted on one side, and brittle
13:32 6 cracks went through the melted and resolidified area.
13:32 7 The thumbnail appearance created by the brittle crack was
13:32 8 not characteristic of fatigue crack rows. No striations
13:32 9 or beach marks were present in the thumbnail region.

13:32 10 I asked you about the fatigue striations and
13:32 11 beach marks with regard to aluminum. Is it the same with
13:32 12 steel, where an arc would erase the evidence of
13:32 13 striations or beach marks?

13:32 14 A. When you melt a piece of metal, whatever was
13:32 15 there previously is altered.

13:32 16 Q. Uh-huh. The -- let me show you Slide 122 from
13:33 17 Dr. Kumar's PowerPoint. This is the steel core from
13:33 18 north phase Item 1 failed end.

13:33 19 A. Yes, I recognize it.

13:33 20 Q. Okay. Can you tell me, this is not -- well,
13:33 21 first, let's make sure we're on the same page in our
13:33 22 terminology.

13:33 23 What does necking or pencil necking (sic) mean?

13:33 24 A. What do you see pencil necking?

13:34 25 Q. Tensile necking. Sorry.

STENO

13:34 1 A. Oh, tensile.

13:34 2 It's -- when I take a ductile piece of metal
13:34 3 and pull it at room temperature and I pull it with a very
13:34 4 substantial load, the diameter begins to get smaller,
13:34 5 especially in a local area. And that lateral contraction
13:34 6 of the diameter is what's referred to as necking.

13:34 7 And so for an overload fracture in steel or
13:34 8 aluminum at room temperature the metal would pull itself,
13:34 9 stretch out, maybe analogous to a piece of taffy, and
13:34 10 then finally separate. And adjacent to the area of
13:34 11 separation you would see a reduced diameter leading up to
13:35 12 the fracture.

13:35 13 Q. Okay. That's in a necking situation, in
13:35 14 tensile necking. Is -- is -- if you had a fatigue
13:35 15 failure of the steel core conductor would you see tensile
13:35 16 necking?

13:35 17 A. No. They -- they're different fracture
13:35 18 mechanisms that exhibit different features when they
13:35 19 occur.

13:35 20 Q. Sure. And so do you believe that a steel core
13:35 21 under fatigue failure and -- well, let me step back. You
13:35 22 don't believe the steel core failed from a fatigue
13:35 23 failure, correct?

13:35 24 A. Yeah, that's -- the description in -- for this
13:35 25 slide is the opposite of a fatigue failure.

STENO

13:35 1 Q. Okay. And if a -- if a fatigue fracture
13:35 2 occurred with the steel core what would you expect to
13:36 3 see?

13:36 4 A. If you look at that article that I provided on
13:36 5 page 1 of -- or the first page I should say of the
13:36 6 article, "Fatigue Fracture Appearances" --

13:36 7 Q. Uh-huh.

13:36 8 A. -- in Figure 1 they have a cylindrical object.
13:36 9 You would see the progressive advancement of the crack as
13:36 10 it grew through the metal, and it would leave behind
13:36 11 striations and beach marks.

13:36 12 Q. Okay. Now, that -- let me see. Let me attach
13:36 13 this article so we're on the same page. That's in your
13:36 14 file on -- I got it here. It's under literature, I
13:37 15 believe.

13:37 16 Here we go. All right. Since we're talking
13:37 17 about this I'll drop it in the document -- or in the
13:37 18 exhibit. I think we're at Exhibit 9. Okay. All right.

13:37 19 I will mark as Exhibit 9 the document in your
13:37 20 file under literature titled, "Fatigue Fracture
13:37 21 Appearances." It is a 15-page article out of the ASM
13:37 22 Handbook.

13:37 23 Is this the article here, sir, you're
13:37 24 referencing?

13:37 25 A. Yes.

STENO

13:37 1 (Exhibit 034-0009 marked.)

13:37 2 BY MR. BRISCO:

13:37 3 Q. Okay. And -- okay. So tell me again, why did
13:37 4 you include that article in your file materials?

13:38 5 A. Well, because it describes what a fatigue
13:38 6 fracture would look like.

13:38 7 Q. Okay. In the article does it describe what a
13:38 8 fatigue fracture would look like of aluminum strands of
13:38 9 an ACSR conductor?

13:38 10 A. Well, it -- it's unlikely it would be aluminum
13:38 11 strands of an ACSR conductor, because the stressors are
13:38 12 so low in the aluminum, you wouldn't get fatigue unless
13:38 13 you were at an insulator where you developed some damage
13:38 14 due to wear.

13:38 15 Q. Yeah.

13:38 16 A. And reduce the section of the conductor and
13:38 17 then possibly or theoretically get fatigue if there's
13:39 18 enough wear damage. As a practical matter, the only time
13:39 19 I've seen fatigue in conductors is copper conductors
13:39 20 at -- that have been damaged at insulators.

13:39 21 Q. How about a steel core conductor, does the
13:39 22 article discuss the fatigue fracture with regard to a
13:39 23 steel core conductor?

13:39 24 A. Yeah. This article describes --

13:39 25 Q. Sorry to interrupt you, I just want to make
STENO

13:39 1 sure we're on the same page. I appreciate you wanting to
13:39 2 explain the article in full, but I just want to know kind
13:39 3 of, you know, so I don't have to go through the whole
13:39 4 thing, does it have -- is it a yes or no, does it
13:39 5 actually deal with a steel core conductor fatigue
13:39 6 fracture?

13:39 7 A. It deals with steel and what a fatigue fracture
13:39 8 looks like in steel and other metals.

13:39 9 Q. Is the steel heated up in this article like a
13:40 10 steel core conductor?

13:40 11 A. What are you talking about?

13:40 12 Q. So my question is --

13:40 13 A. When does the steel core get heated?

13:40 14 Q. Well, let me ask you this. When a steel core
13:40 15 is in the air is it energized?

13:40 16 A. Yes.

13:40 17 Q. Okay. And so --

13:40 18 A. Well, if you have current going through it.

13:40 19 Q. Right. Okay. So does the article discuss a
13:40 20 failure of steel when it's energized? It's a yes or
13:40 21 no --

13:40 22 A. I doubt it does specifically but it shows you
13:40 23 what a fatigue fracture would look like in steel and
13:40 24 other metals.

13:40 25 Q. Okay. I'm just -- I don't want to take
STENO

13:40 1 everybody's time and read the whole article. I'm just
13:40 2 trying to understand what's in or out of the article.

13:40 3 So does the article in Exhibit 9 from your
13:40 4 file, does it discuss fatigue fractures of steel that's
13:41 5 undergoing resistive heating?

13:41 6 A. Not that I'm aware of, nor would you expect
13:41 7 resistance heating in the steel core. And if it did
13:41 8 occur then you would -- to any significant degree, you
13:41 9 would see an alteration in the microstructure.

13:41 10 Q. Let me ask you, if a steel core underwent
13:41 11 resistive heating before failure, did the steel core
13:41 12 exhibit tensile necking before failure?

13:41 13 A. You broke up just a little there at the end.

13:41 14 Q. Sure.

13:41 15 If the steel core exhibited resistive heating
13:41 16 before failure, could the steel core exhibit tensile
13:41 17 necking?

13:41 18 A. Well, it depends on the temperature. If it's
13:41 19 relatively low temperature, like below 600 Farenheit, it
13:42 20 probably would. But as you approach higher temperatures
13:42 21 then the ductility of the steel diminishes, and you don't
13:42 22 get the necking. But you have to look at how realistic
13:42 23 your hypothetical is, number one.

13:42 24 Number two, if you get high level resistance
13:42 25 heating through a steel core, that heat alters the

STENO

13:42 1 microstructure. It either anneals it or recrystallizes
13:42 2 it, something that didn't happen here.

13:42 3 Q. Sure. Yeah. I was -- I was simply focused on
13:42 4 the necking part and if resistive heating can heat a
13:42 5 steel core to the point that it will exhibit necking?

13:42 6 A. Well, the steel core will exhibit necking at
13:43 7 room temperature. So you don't need any heating to get
13:43 8 necking. And you referred me to a slide, I believe, 122.

13:43 9 Q. Yep.

13:43 10 A. This slide, this is where we started, talks
13:43 11 about necking. Let me tell you how wrong that is. The
13:43 12 end of that wire has obviously been melted --

13:43 13 Q. Sir, sir, I appreciate it. Let's just -- I
13:43 14 don't want to be here all day with you, so it's my pay
13:43 15 period on this one. So let me just go through the
13:43 16 questions that I have so that we can get done in time. I
13:43 17 appreciate it.

13:43 18 So can a steel core exhibit necking under
13:44 19 normal temperatures?

13:44 20 A. Normal being like room temperature?

13:44 21 Q. Yes.

13:44 22 A. The answer is, yes, if it's exposed to tensile
13:44 23 forces that will exceed the ultimate breaking strength of
13:44 24 the core. In other words, necking is a feature that
13:44 25 develops when you have an overload fracture, where the

STENO

13:44 1 applied forces exceed the strength of the metal that
13:44 2 we're talking about, in this case the steel core.

13:44 3 Q. How about when -- if there's resistive heating,
13:44 4 can a steel core exhibit necking when there's resistive
13:44 5 heating?

13:44 6 A. A little bit of resistance heating. I mean --

13:44 7 Q. Let me --

13:44 8 A. -- I've given you that answer before but --

13:45 9 Q. Let me ask you this.

13:45 10 A. I know you -- I know you don't want to give me
13:45 11 narratives but I can go through this quickly.

13:45 12 Q. No. I want to go through it quickly, that's
13:45 13 why I want -- some of these things I just want to know a
13:45 14 quick answer to. So just focus on the question and go
13:45 15 from there.

13:45 16 A. You know, I'm trying to, but I'm trying to give
13:45 17 you a complete answer.

13:45 18 Q. I appreciate it.

13:45 19 A. That seems to be where you're cutting me off.

13:45 20 Q. Yeah. Well, okay. Let's talk about alloying a
13:45 21 bit. Can you describe for me what the basic term
13:45 22 alloying is?

13:45 23 A. When you have mutual melting you can have
13:45 24 elements from the one of the strands coming together with
13:45 25 elements of the other strand.

STENO

13:45 1 Q. And did the separation in --

13:45 2 A. There's -- there's another use of the term, but
13:46 3 I don't believe it's being used here.

13:46 4 Q. Did the separation ends of the steel core on
13:46 5 both -- both sides of the north conductor in the main
13:46 6 failure area, did those separation ends alloy with
13:46 7 aluminum?

13:46 8 A. I would have to look at the element traces.
13:46 9 Let me just see if I can -- if you go to Slide 186.

13:46 10 Q. Uh-huh. I'm there.

13:46 11 A. Okay. That shows both ends of the steel core,
13:46 12 and you see the melted structure at the ends?

13:46 13 Q. Yes.

13:46 14 A. You have to look at the element traces taken in
13:46 15 that melted area to see if you find any evidence of
13:47 16 aluminum or even Zinc, but you have to be a little
13:47 17 careful because you have to know what polishing compound
13:47 18 they use to prepare these samples.

13:47 19 Q. Sure. And so my question for you is, does the
13:47 20 separated end of a steel core, in fact, show evidence of
13:47 21 alloying with aluminum?

13:47 22 A. All I can say is in Slides 181 to 184 it shows
13:47 23 a small aluminum peak in the area that's obviously melted
13:47 24 at the end of the steel core.

13:47 25 Q. Uh-huh. And that would indicate some level of
STENO

13:48 1 alloying between the steel core and the aluminum,
13:48 2 correct?

13:48 3 A. My only cautionary note is, there's also
13:48 4 another area that doesn't show it, and you need to look
13:48 5 at the polishing compound that was used.

13:48 6 Q. But was that a yes or a no, that it did alloy
13:48 7 with the aluminum?

13:48 8 A. You just need more information.

13:48 9 Q. Okay. So are you unable to tell me if alloying
13:48 10 took place?

13:48 11 A. I'm unable to confirm it without knowing the
13:48 12 polishing compound that was used.

13:48 13 Q. Okay. But do the test results show evidence of
13:48 14 aluminum on the -- alloying with the steel?

13:48 15 A. It shows on the polished surface a small
13:48 16 aluminum peak.

13:48 17 Q. Okay. How about going the other way, the
13:48 18 surface of the adjacent failed aluminum strands, do they
13:48 19 show any evidence of alloying with the steel?

13:48 20 A. Do you have certain slides in mind?

13:49 21 Q. Let me see. I'm trying to pull up the EDS.
13:49 22 Here we go. 112.

13:49 23 A. That doesn't help.

13:49 24 Q. 112 is the fracture surface of one of the
13:49 25 aluminum strands, correct?

STENO

13:49 1 A. Yes.

13:49 2 Q. Okay. And it shows zinc vapor deposits,
13:50 3 correct?

13:50 4 A. It shows zinc present, yes.

13:50 5 Q. Okay. And the steel core is coated with zinc,
13:50 6 correct?

13:50 7 A. Yes.

13:50 8 Q. Okay. And so if -- during the failure event
13:50 9 was there a transfer of zinc vapor deposits from the
13:50 10 steel core on to the aluminum fracture surface?

13:50 11 A. Well, there was a transfer of zinc on to the
13:50 12 aluminum fracture surface. It doesn't really tell you if
13:50 13 it's particles or vapor. But we know there's mutual
13:50 14 arcing, or there's arcing in the area that included
13:50 15 melting of both the aluminum and the steel core.

13:50 16 Q. And do you believe that's why the transfer of
13:51 17 metals occurred?

13:51 18 A. Yes.

13:51 19 Q. Is there a parting arc that occurred between
13:51 20 the two failed ends of the steel core?

13:51 21 A. No.

13:51 22 Q. If a parting arc had occurred between the two
13:51 23 failed ends of the steel core would you get this, a
13:51 24 transfer of metals or vapor deposits as we saw in the EDS
13:51 25 slides?

STENO

13:51 1 A. I think it's unlikely because they're
13:51 2 separating from each other, under that theoretical
13:51 3 hypothetical.

13:51 4 Q. In your sequence of events was the steel core
13:51 5 the last strand to fail at the -- at the failure area?

13:51 6 A. Well, I can't say exactly, but what I can say
13:52 7 is there was enough arc damage that it also included
13:52 8 melting of the steel core. So a portion of the aluminum
13:52 9 strands were melted. A portion -- or the steel core
13:52 10 exhibits melting. And then the others could just
13:52 11 fracture because they're very hot. But at that point the
13:52 12 aluminum would have very little strength, and the steel
13:52 13 core strength would be reduced to zero or near zero
13:52 14 because of the extent of melting.

13:52 15 Q. Let me show you Slide 126 on Dr. Kumar's
13:53 16 PowerPoint.

13:53 17 So there was an area six feet to the east of
13:53 18 the failure location where there was multiple aluminum
13:53 19 strands broken, as well as the steel core broken in this
13:53 20 area, and the conductor was only being held by three
13:54 21 aluminum strands.

13:54 22 Do you recall that, sir?

13:54 23 A. I'm looking at the photograph and I can see
13:54 24 three aluminum strands still intact, and I can see the
13:54 25 arc damage to the other aluminum strands. And I know if

STENO

13:54 1 you continue on there's arc damage to the steel core as
13:54 2 well.

13:54 3 Q. Okay. Do you know why the steel core failed at
13:54 4 this location before the remaining exterior aluminum
13:54 5 strands failed?

13:54 6 A. Well, there wasn't a separation at this point.
13:54 7 And the steel core, if you go to Slide 189 --

13:55 8 Q. Uh-huh. Yep.

13:55 9 A. Yeah. You see where the side of the steel core
13:55 10 is melted?

13:55 11 Q. Yep.

13:55 12 A. That's the light area and then there's brittle
13:55 13 cracks that go through the resolidified metal.

13:55 14 Q. Uh-huh.

13:55 15 A. The core breaks because it's all melting
13:55 16 associated with arcing, and that arcing has to come in
13:55 17 from the side that melted the aluminum strands. And then
13:55 18 the surviving strands are likely on the opposite side of
13:56 19 the melting damage that you see on the steel core.

13:56 20 Q. Okay. When you say there's arcing on the side
13:56 21 of the steel core here, do I have that right?

13:56 22 A. Yes.

13:56 23 Q. Can that arcing be from a parting arc from an
13:56 24 adjacent failed aluminum strand?

13:56 25 A. No.

STENO

13:56 1 Q. Why not?

13:56 2 A. Well, you still have a conductive path through

13:56 3 this area, and so there's no different -- there's no

13:56 4 voltage differential across these wires. That's what I

13:56 5 was talking about earlier.

13:56 6 Q. I guess maybe I --

13:56 7 A. Plus --

13:56 8 Q. -- could heat from a parting arc cause this

13:56 9 same type of damage that we see in Slide 189?

13:57 10 A. No.

13:57 11 Q. It would look differently if it was heat from a

13:57 12 parting arc?

13:57 13 A. Well, you wouldn't get a parting arc because it

13:57 14 didn't separate, this area didn't separate.

13:57 15 Q. No. No. That's -- what I'm asking you is,

13:57 16 what type of damage a parting arc could cause, right. I

13:57 17 understand you don't believe a parting arc occurred here.

13:57 18 I get that. What I'm --

13:57 19 A. Well --

13:57 20 Q. What I'm trying to understand is, could the

13:57 21 heat from a parting arc cause damage that looks similar

13:57 22 to what we see in Slide 189?

13:57 23 A. No.

13:57 24 Q. Why not?

13:57 25 A. Well --

STENO

13:57 1 Q. Is it not hot enough? Is it -- why wouldn't it
13:57 2 do that?

13:57 3 A. The times where I've seen conductors separate,
13:57 4 I mean, ACSR conductors separate, there's been no
13:57 5 evidence metallurgically of heat associated with a
13:57 6 parting arc.

13:57 7 Q. So you don't believe there's heat associated
13:57 8 with a parting arc?

13:57 9 A. I just tell you, I don't believe there will be
13:58 10 a parting arc. I mean, it's -- it's possible that you
13:58 11 may get a little tick, a spark, but it wouldn't be the
13:58 12 kind of arcing that you get when you have conductors come
13:58 13 in contact with each other and melt away the side of the
13:58 14 conductor.

13:58 15 Q. Okay.

13:58 16 A. Why would the parting arc be on the side of the
13:58 17 core?

13:58 18 Q. So here's what I want to ask you is -- so we
13:58 19 started out talking about the steel core being broken in
13:58 20 this area six feet away from our failure area, and the
13:58 21 lines are only being held up by three aluminum strands at
13:58 22 this location, correct?

13:58 23 A. Well, you need to be careful --

13:58 24 Q. Make sure we're on the same page, though, that
13:58 25 that's --

STENO

13:58 1 A. Yeah, just hold on a minute. You see the
13:58 2 deformation in 127 on the three surviving aluminum
13:59 3 strands?

13:59 4 Q. Yes. Wait.

13:59 5 A. You see the deformation on the right there?
13:59 6 Yeah. This area has been deformed after it came down.

13:59 7 Q. Okay.

13:59 8 A. Okay. So I don't know how soon after, maybe
13:59 9 it's consistent with the damage in the parking lot that
13:59 10 was described. Maybe it's consistent with coiling or
13:59 11 handling. But you have to keep in mind that this area is
13:59 12 different than the way it looked as soon as it came down,
13:59 13 except for the melting. The melting obviously had to
13:59 14 occur when it was in the air. But I'm just saying
13:59 15 there's evidence of mechanical damage deformation after
13:59 16 this conductor came down.

13:59 17 Q. Okay. You -- the image on the left here on
14:00 18 Slide 126, would you consider that bird caging?

14:00 19 A. No, I would not.

14:00 20 Q. What do you understand bird caging to be?

14:00 21 A. If you look at Opinion 9, bird caging is a term
14:00 22 used when the outer strands are displaced outward from
14:00 23 the inner strands by a relatively uniform amount. For
14:00 24 ACSR the outer strands are aluminum and the core strand
14:00 25 is steel. Bird caging in ACSR can be caused by a sudden

STENO

14:00 1 release of tension in the conductor or by the heat from a
14:00 2 ground fire.

14:00 3 And there's another sentence that talks about
14:01 4 one slide that does exhibit minor bird caging, but what
14:01 5 you're seeing here is where some of the aluminum strands
14:01 6 have been deformed after they've separated. That's --
14:01 7 you would not apply bird caging to that condition.

14:01 8 Q. And that's because you see evidence of
14:01 9 mechanical damage there?

14:01 10 A. Well, yeah. Plus, you know, keep in mind, bird
14:01 11 caging has a very characteristic appearance, and this
14:01 12 doesn't show that uniform outward deformation. It just
14:01 13 shows some mechanical forces after the arcing event that
14:01 14 occurred.

14:01 15 Q. You say here in Opinion 9 that bird caging in
14:01 16 ACSR can be caused by a sudden release of tension in the
14:02 17 conductor or by the heat from a ground fire?

14:02 18 A. Correct.

14:02 19 Q. Can bird -- yeah. Can bird caging also be
14:02 20 caused by the movement of a conductor while it's in the
14:02 21 air and the wind from contraction and release from that
14:02 22 wind movement?

14:02 23 A. From contraction to release?

14:02 24 Q. You're cutting out just a bit.

14:02 25 A. Is that what you said?

STENO

14:02 1 Q. Yeah. From contraction and release from that
14:02 2 conductor in the air.

14:02 3 A. No.

14:02 4 Q. Okay. Can a conductor experience bird caging
14:02 5 from wind movement in the air?

14:02 6 A. I don't believe so, and I've certainly never
14:02 7 seen it.

14:02 8 Q. You've never seen bird caging on a line while
14:02 9 it's suspended in the air?

14:02 10 A. I cannot recall an occasion that I have. The
14:02 11 times I've seen bird caging is when conductor -- when
14:02 12 there's a conductor separation and falls to the ground
14:03 13 and mostly it's been heat damaged that creates the bird
14:03 14 caging.

14:03 15 Q. So you've never seen an example of bird caging
14:03 16 where a line hadn't already come down?

14:03 17 A. I can't say I have. If -- if I'm shown one
14:03 18 then I would have to analyze the conductor.

14:03 19 Q. Okay. This is a good point pivoting between
14:03 20 opinions to take a break. Let's take ten minutes, sir.

14:03 21 A. Okay.

14:03 22 THE VIDEOGRAPHER: Time is 2:02 p.m. We are
14:03 23 off the record.

14:03 24 (A recess was taken.)

14:20 25 THE VIDEOGRAPHER: The time is 2:19 p.m. We
STENO

14:20 1 are back on the record.

14:20 2 BY MR. BRISCO:

14:20 3 Q. All right. Thank you, Dr. Fowler.

14:20 4 I'm going to ask you about the areas of
14:20 5 movement of a conductor while it's in the air. Does the
14:20 6 area of an overhead conductor have its maximum movement
14:20 7 near the mid span in windy conditions?

14:20 8 A. Generally, yes, because it's fixed at the ends.

14:20 9 Q. So have you ever seen a fatigue failure in
14:21 10 overhead conductors near that mid span?

14:21 11 A. I have not.

14:21 12 Q. We talked earlier about the -- there was more
14:21 13 than one line slap event between the north and center
14:21 14 phase conductor is your opinion, correct?

14:21 15 A. I remember questions, and I think my answer was
14:21 16 metallurgically I can -- I see obvious evidence of one.
14:21 17 And then I sort of referred you to perhaps what
14:21 18 Dr. Russell might be able to tell, or maybe not, from the
14:21 19 recloser data.

14:21 20 Q. Sure.

14:21 21 And earlier you -- the point one of your
14:21 22 opinion talks about Kumar referencing 50 strand failure
14:22 23 break locations, and that's where you're telling me,
14:22 24 well, not saying there's 50 incidents of line slap, but
14:22 25 that all 50 of the breaks, of the strand breaks were

STENO

14:22 1 caused by line slap; is that correct?

14:22 2 A. Yes.

14:22 3 Q. One --

14:22 4 A. Well, really what I'm saying is I believe at
14:22 5 one point Dr. Kumar offered the number of about 50.

14:22 6 Q. Uh-huh.

14:22 7 A. And I'm just saying, every time we saw a wire,
14:22 8 a separated strand, there was arcing associated with that
14:22 9 from the line slap.

14:22 10 Q. Right. And so a line slap could break more
14:22 11 than one slan -- strand, excuse me; is that fair?

14:22 12 A. Yes.

14:22 13 Q. Do you have an opinion as to how many actual
14:22 14 line slap events we had between the north and center
14:22 15 phase conductor?

14:22 16 A. Boy, that sounds like what I just answered and
14:23 17 what I answered previously. I --

14:23 18 Q. It shouldn't be -- give it to me real quick.

14:23 19 I can't tell whether -- it's not 50, because
14:23 20 you said one line slap can break more than one strand,
14:23 21 and so -- but it's not one because we looked at different
14:23 22 locations where you said, that's a line slap, that's a
14:23 23 line slap, that's a line slap.

14:23 24 So let me get to my question which is, do you
14:23 25 have an opinion as to the number of line slaps that

STENO

14:23 1 occurred between the north phase and center phase

14:23 2 conductor?

14:23 3 A. You know, I think I know where the problem is.

14:23 4 You can have multiple arc areas with one line slap.

14:23 5 Q. Okay.

14:23 6 A. So I don't know the number of line slaps.

14:23 7 Q. Uh-huh.

14:23 8 A. It's certainly one. It could be more. And I
14:23 9 think you would probably need the input of Dr. Russell to
14:23 10 talk about that.

14:23 11 Q. So do you know how many arc areas you can have
14:23 12 for one line slap?

14:24 13 A. I -- I've never heard of a specific number. I
14:24 14 mean, sometimes you have multiple areas. Sometimes maybe
14:24 15 just one or a few.

14:24 16 Q. Right. Considering the locations of the broken
14:24 17 conductors where you show evidence of line slap, is it
14:24 18 fair to say we definitively have more than one line slap
14:24 19 incident between the north and center phase conductors?

14:24 20 A. I'm not offering a number.

14:24 21 Q. Okay. Do you think that one single line slap
14:24 22 event could have caused all of the line slap arc marks
14:24 23 and broken strands that we see on these conductors?

14:24 24 A. Potentially, but I would suggest directing that
14:24 25 question to Dr. Russell.

STENO

14:24 1 Q. Okay. Do you believe that the use of spacers
14:24 2 would have prevented or -- the line slap from occurring?
14:25 3 A. That's beyond the scope of what I've addressed.
14:25 4 Q. Do you know what a spacer is?
14:25 5 A. Yes.
14:25 6 Q. Okay. What's a spacer?
14:25 7 A. It's a nonconductive piece of equipment that's
14:25 8 put on two or perhaps more conductors.
14:25 9 Q. What's the purpose of a spacer?
14:25 10 A. To keep the conductors apart.
14:25 11 Q. Okay. Prevent line slap?
14:25 12 A. That potentially can.
14:25 13 Q. Do you know why the north and center phase
14:25 14 conductor were able to slap together if indeed they were
14:25 15 constructed in compliance with G0 95 or otherwise
14:25 16 properly spaced?
14:25 17 A. That's way beyond the scope of anything I
14:25 18 addressed.
14:25 19 Q. How about from a metallurgical standpoint, do
14:26 20 you know how -- do you know if the conductors were
14:26 21 properly spaced at the time of installation such that
14:26 22 they wouldn't slap, do you know metallurgically what
14:26 23 could have changed with the conductors to allow them to
14:26 24 slap?
14:26 25 A. Are you suggesting the conductors changed? Or
STENO

14:26 1 are you suggesting that an outside force, like a
14:26 2 turbulent wind, is acting on them now?

14:26 3 Q. I don't -- I'm not making any suggestion
14:26 4 whatsoever. I'm trying to understand if -- you're saying
14:26 5 that the line slapped in this case. So I'm trying to
14:26 6 understand, could the lines have always slapped, from
14:26 7 date of installation until now in your opinion? Is that
14:26 8 a yes or a no?

14:26 9 A. No.

14:26 10 Q. Okay. So what changed metallurgically speaking
14:26 11 from the date of installation to the date of the fire
14:26 12 when the lines slapped together in your opinion?

14:26 13 A. Nothing.

14:26 14 Q. So --

14:27 15 A. It's always been ACSR. We talked about a
14:27 16 section being replaced, but metallurgically, it's still
14:27 17 the same metals.

14:27 18 Q. Okay. And how about --

14:27 19 A. You have to realize that the outside force, the
14:27 20 turbulent wind, is likely what's causing the line slap.

14:27 21 Q. Okay. But is the turbulent wind elongating the
14:27 22 lines?

14:27 23 A. No.

14:27 24 Q. So the turbulent wind is just allowing two
14:27 25 lines to reach each other that otherwise are physically

STENO

14:27 1 capable of reaching each other; is that fair?

14:27 2 A. That otherwise are physically capable?

14:27 3 Q. Yes, correct. So if you stretched out the

14:27 4 lines in a wind event towards each other they would reach

14:27 5 each and other slap, correct?

14:27 6 A. Well, you're talking about stretching, which

14:27 7 implies from end to end, versus more of a turbulent

14:28 8 movement of the conductors due to the wind.

14:28 9 Q. Now, from a metallurgical standpoint, if the

14:28 10 lines were insulated lines and slap together would the

14:28 11 arcing event occur?

14:28 12 A. It would be less likely. It depends on the

14:28 13 severity of the contact and the insulation. And beyond

14:28 14 that you should probably ask Dr. Russell.

14:28 15 Q. How about once the line came down to the

14:28 16 ground, is a insulated line on the ground less likely to

14:28 17 cause an arcing event with the ground?

14:28 18 A. I really haven't thought of that.

14:29 19 Q. I'll give you a moment, it's okay.

14:29 20 A. Well, to the extent you can prevent contact

14:29 21 between the conductor and the ground that it would act to

14:29 22 reduce the opportunity for arcing.

14:29 23 Q. Yeah. I believe when we saw your span

14:29 24 measurement drawing before, I think it was Exhibit 3 --

14:29 25 4, sorry. Let's see. Well, no. Do you have it in front

STENO

14:30 1 of you, sir, your -- oh, it's Exhibit 5, sorry. Yeah.
14:30 2 Your Exhibit 5 showed repair splices in the mid span area
14:30 3 of the north phase conductor, correct?
14:30 4 A. Yes.
14:30 5 Q. And does that suggest to you that the mid span
14:30 6 was previously replaced as a result of line slap damage?
14:30 7 A. It suggests to me it was previously replaced.
14:30 8 I don't -- I don't know why it was replaced.
14:30 9 Q. All right. But you don't believe a fatigue
14:30 10 failure could have occurred in that mid span area, right?
14:30 11 A. No.
14:30 12 Q. Is there anything else that could have caused
14:30 13 damage to that mid span area, besides a prior line slap
14:30 14 to you?
14:30 15 A. Something being blown into the line creating
14:30 16 mechanical damage.
14:30 17 Q. No trees directly next to this line is there?
14:31 18 A. Not directly next to it, yes.
14:31 19 Q. Okay. Let me look at -- let's look at Opinion
14:31 20 Number 7. I believe we covered six in our prior
14:31 21 discussions. Number seven says the fatigue strength of
14:31 22 the ACSR conductor far exceeds the applied forces, even
14:31 23 during windy conditions.
14:31 24 Let me read through these with you, sir, just
14:31 25 to make sure we've got them all.

STENO

14:31 1 The strength of the steel core is sufficient to
14:31 2 support the ACSR conductor for a 304-foot span. The
14:31 3 applied cyclic stress on the aluminum strand, even for
14:31 4 five times the static tension of the conductor, is well
14:31 5 below the fatigue strength for 1350-H19 aluminum. The
14:31 6 fatigue strength for the steel core is approximately
14:31 7 100,000 PSI and far exceeds the applied cyclic stress.
14:31 8 The Number 4, 7/1 ACSR has a rated breaking strength of
14:32 9 2,360 pounds. Citing Lib 001. The applied tension in
14:32 10 the conductor for a 300-foot span is 46 pounds. Citing
14:32 11 Lib 11879. The steel core carries the majority of the
14:32 12 tensile forces due to the higher elastic modules. Steel
14:32 13 equals 30 times N to the six PSI, aluminum 10 times 10 to
14:32 14 the six PSI in construction of the ACSR. The aluminum
14:32 15 strands carry relatively little of the tension forces.
14:32 16 The high stresses are at the end of the conductor, where
14:32 17 it is attached to the insulator, not mid span. The
14:32 18 splices on the north conductor indicate a prior
14:32 19 replacement in the mid span area?

14:32 20 Did I accurately read your opinion number
14:32 21 seven, sir?

14:32 22 A. Yes. I don't know if you pronounced modules
14:32 23 correctly, but that's the only glitch I heard.

14:32 24 Q. Yeah. Certainly possible. I'll acknowledge
14:33 25 that.

STENO

14:33 1 A. Or maybe there was a pause in the transmission.

14:33 2 Q. Yeah. So then -- I read a lot here. Let's
14:33 3 see. So tell me the fatigue strength of a steel core of
14:33 4 an ACSR conductor?

14:33 5 A. It's about 100,000 PSI.

14:33 6 Q. And what does that mean in terms of, give me a
14:33 7 layman's translation of that?

14:33 8 A. Well, that means that that so far exceeds the
14:33 9 stresses in the steel core that you're not going to get a
14:33 10 fatigue strength -- excuse me, a fatigue crack in the
14:33 11 steel core.

14:33 12 Q. Is it fair to say that you believe unless
14:33 13 something struck the steel core, such as a line slap
14:33 14 incident we have here, even when the aluminum strand --
14:33 15 even if the aluminum strands had broken, you believe the
14:33 16 steel core could have held the line?

14:34 17 A. Yeah. The steel core by itself can hold about
14:34 18 1,700 pounds, and the force on the conductor, the applied
14:34 19 tension in the conductor is about 46 pounds. So you
14:34 20 can -- you can see that the core and indeed the ACSR that
14:34 21 has a breaking strength of 2360 far exceeds anything
14:34 22 that's applied to it.

14:34 23 Q. Let's see. I'm going to introduce Exhibit 10.
14:34 24 It is a document from your file marked ACSR and it is
14:35 25 16-page document.

STENO

14:35 1 (Exhibit 034-0010 marked.)

14:35 2 BY MR. BRISCO:

14:35 3 Q. Can you see the first page here, sir?

14:35 4 A. Yes.

14:35 5 Q. Okay. And then on Page 3 there's these
14:35 6 handwritten notes. Are these your notes, sir?

14:35 7 A. Yes. Calculations.

14:35 8 Q. Okay. What are you calculating here, sir?

14:35 9 A. Well, what I've done is I've taken the size,
14:35 10 namely the diameter and the material properties from the
14:35 11 ASTM specifications and from that first document you
14:35 12 showed me, and then calculated the area of an aluminum
14:35 13 strand and a steel strand, multiplied it times the
14:35 14 tensile strength, and that gives you the force that it
14:36 15 would take to break an individual strand, whether it
14:36 16 be -- I did it for both aluminum and steel.

14:36 17 And then at the bottom I said, well, let's
14:36 18 elevate the temperature to 1200 Farenheit, which is about
14:36 19 the melting temperature of aluminum. And then I provided
14:36 20 another page that shows you the strength of steel at that
14:36 21 temperature, and it's about 35 percent of the ultimate
14:36 22 tensile strength. So that even at elevated temperature
14:36 23 you still have plenty of residual strength.

14:36 24 Q. Gotcha.

14:36 25 So just to make sure I got the math here, if
STENO

14:36 1 there's -- if we're not adding heat to the steel core,
14:36 2 the minimum strength of the steel core is this 1,000 --
14:36 3 you may not be able to see my cursor -- but in the middle
14:36 4 of the Page 3 on Exhibit 10 this 1,705 pounds, correct?

14:37 5 A. Yes.

14:37 6 Q. Okay. And then you add 1200 degrees of heat
14:37 7 from the aluminum strand failure, that steel core
14:37 8 strength dropped from 1705 pounds to 597 pounds?

14:37 9 A. Yeah. You threw in an extra word or two there.
14:37 10 That number is simply, what is the strength of the steel,
14:37 11 and therefore the core strand, at 1200 Farenheit. And
14:37 12 that's where you come up with almost 600 pounds.

14:37 13 Q. Okay. Now, if the steel core experienced
14:37 14 resistive heading, would that resistive heating exceed
14:37 15 1200 Farenheit?

14:37 16 A. Well, the problem you have, if that were to
14:37 17 occur, theoretically, then you would see an alteration in
14:38 18 the microstructure, and you don't have that.

14:38 19 Q. But first, my question was, is a resistive
14:38 20 heating in the steel core in excess of 1200 degrees
14:38 21 Farenheit?

14:38 22 A. Well, as the temperature goes up the strength
14:38 23 goes down.

14:38 24 Q. Correct. And does resistive heating have a
14:38 25 temperature -- resistive heating of a steel core have a

STENO

14:38 1 temperature in excess of 1200 Farenheit?

14:38 2 A. You would need to ask Don Russell that.

14:38 3 Q. Okay. But generally, you may have said already
14:38 4 when I didn't ask the question, that as the temperature
14:38 5 of the steel core increases, the strength of the steel
14:38 6 core conversely reduces?

14:38 7 A. Correct.

14:38 8 Q. Let me look at Opinion 8 here, sir. I'm going
14:39 9 to read it for the record and confirm I have Opinion 8
14:39 10 correct.

14:39 11 There's not any evidence of a separation arc in
14:39 12 the multiple broken areas in the north and center
14:39 13 conductors. There is one area of separation on the north
14:39 14 phase that exhibited damage due to the arcing when the
14:39 15 north and center phases clashed. Separation arc does not
14:39 16 occur with a broken strand when there is a parallel
14:39 17 conducted path through the remaining strands. ACSR
14:39 18 conductor with low voltage and low current does not
14:39 19 exhibit a separation arc when there is a mechanical
14:39 20 separation, such as a tree falling on the conductor.

14:39 21 All right. I believe we've already talked
14:39 22 about that opinion at length today. If there's something
14:40 23 that I -- we missed that forms the basis of your opinion,
14:40 24 let me know, but I believe we've covered this, correct?

14:40 25 A. Yes.

STENO

14:40 1 Q. Okay. Sir, do you consider yourself an expert
14:40 2 in oxidation?

14:40 3 A. Yes.

14:40 4 Q. Okay. Can you educate me on the difference in
14:40 5 oxidation of aluminum at ambient temperatures versus high
14:40 6 temperatures?

14:40 7 A. Yes. The rate goes up as the temperature
14:40 8 increases.

14:40 9 Q. I'm sorry, I couldn't -- mic cut out. Can you
14:40 10 say that again?

14:40 11 A. The rate of oxidation goes up as the
14:40 12 temperature increases.

14:40 13 Q. Okay. Bear with me one minute, sir. We
14:41 14 already covered nine so I'm going to go back and see what
14:41 15 areas I missed on my notes.

14:42 16 Sir, we talked about line slap between the
14:42 17 north phase and the center phase conductor today. Do you
14:42 18 believe there's evidence of line slap between the center
14:42 19 phase and the roadside conductor?

14:42 20 A. I didn't see any evidence of it.

14:42 21 Q. Okay. Do you know if the roadside conductor is
14:42 22 the same distance from the center phase as the center
14:42 23 phase is from the field side?

14:42 24 A. Approximately so.

14:42 25 Q. Okay. Do you know why we see no evidence of --
STENO

14:43 1 well, strike that.

14:43 2 Do you have any reason to believe why you have
14:43 3 a line slap between the north and center phase conductor
14:43 4 but not the roadside and center phase?

14:43 5 A. I can just tell you they didn't come in
14:43 6 contact.

14:43 7 Q. Did you see any evidence of linear surface
14:43 8 arcing on the surface of the failure area before it
14:43 9 failed?

14:43 10 A. Linear, you mean where the arcing was longer
14:43 11 than it was wide?

14:43 12 Q. Okay. Now you lost me with that. So why don't
14:43 13 I ask you this way.

14:43 14 Do you see any evidence of linear surface
14:44 15 arcing on the north phase conductor?

14:44 16 A. Well, by that you mean it's longer than it is
14:44 17 wide?

14:44 18 Q. Sure. We'll go with that definition.

14:44 19 A. I'd have to go back and look at the different
14:44 20 areas to see if there are some arc areas that are longer
14:44 21 than its width.

14:44 22 Q. Let me ask you this. Does line contact arcing
14:44 23 create any weak areas for a fatigue crack to start?

14:44 24 A. Well, that depends on the extent of melting.
14:44 25 But then that means that the piece would have to be

STENO

14:44 1 exposed to a large number of cyclic stresses for that
14:44 2 damaged area to then to generate a crack extension by
14:45 3 fatigue. And if that you were to occur then that's where
14:45 4 we get back to looking for evidence of striations that
14:45 5 would support that hypothesis.

14:45 6 Q. When the line slap occurred in this case
14:45 7 according to your opinion that brought the line down, can
14:45 8 you explain to me the sequence of events, meaning does
14:45 9 the conductor come down immediately after the line slap
14:45 10 occurs or is there a longer process taking place?

14:45 11 A. Well, you know, it's not a kind of analysis
14:45 12 that can put a specific time sequence to it, except in
14:45 13 order for the conductor to come down the core has to be
14:46 14 either severed or damaged. And we know the core at the
14:46 15 location of separation exhibits melting across the
14:46 16 diameter. That's shown in the metallography on
14:46 17 Slide 186. And the other aluminum strands in that area
14:46 18 show melting damage or increased heat. That's when the
14:46 19 conductor comes down. It's -- it's really the core
14:46 20 strand that is the majority of the strength for the ACSR.

14:46 21 Q. So but from a --

14:46 22 A. I can arc the aluminum strands, like -- like
14:47 23 what happened on the center conductor, but the core
14:47 24 strand is sufficient to keep the line up.

14:47 25 Q. Uh-huh.

STENO

14:47 1 A. But we know on the north phase there were two
14:47 2 areas where the arcing got to the core strand, and one of
14:47 3 them in the more extensive amount of melting is at the
14:47 4 area of separation.

14:47 5 Q. But from a timing standpoint how long after the
14:47 6 line slap occurred in this case did the line come down, a
14:47 7 second or less or much more than that?

14:47 8 A. It would come down as soon as the core couldn't
14:47 9 support it and the aluminum strands are either melted or
14:47 10 heated.

14:47 11 Q. Okay. And is that time a second or less or
14:47 12 much longer?

14:47 13 A. It's very quick. I don't know that I can put a
14:47 14 particular time on it.

14:48 15 Q. Quick housekeeping, sir. I'm going to mark as
14:49 16 Exhibit 11 a folder -- I'm sorry -- a document in your
14:49 17 file titled, "Metallurgical Photos and Data." It is --
14:49 18 I'm presenting it now, it's a 24-page document that
14:49 19 starts with some notes. It's an e-mail from Steven
14:49 20 Scordalakis at the top to Fowler, Inc., and some other
14:49 21 folks here.

14:49 22 But you see the various melting center phase
14:49 23 notes at the top of the page?

14:49 24 A. Yes.

14:49 25 (Exhibit 034-0011 marked.)

STENO

14:49 1 BY MR. BRISCO:

14:49 2 Q. What is this document, this 24-page document
14:49 3 marked as Exhibit 11?

14:50 4 I couldn't hear your answer if you described
14:50 5 the document?

14:50 6 A. Oh, I'm sorry, I didn't hear the question.

14:50 7 Q. Sorry. I just asked you what this document is
14:50 8 marked as Exhibit 11.

14:50 9 A. The underlying document is an e-mail that you
14:50 10 identified. Then that data was transmitted to me, and
14:50 11 these are the notes I made during the initial look at --
14:51 12 at that metallurgical data.

14:51 13 Q. So these are all -- on Exhibit 11 these are all
14:51 14 your notes regarding your review of the metallurgical
14:51 15 data provided to you by counsel?

14:51 16 A. Yes. That was the first time I looked at it.
14:51 17 Just so I knew what was -- what was in that file.

14:51 18 Q. Okay. Then I'm almost there. We've gone
14:51 19 through your opinion sheet. I've got some more questions
14:51 20 to ask, but I want to -- let's take a break now so I can
14:51 21 get my thoughts and things will move a little quicker.

14:51 22 So why don't we take ten minutes now and come
14:51 23 back at 3:00 and then move to the finish line there.
14:51 24 Sound good?

14:51 25 A. Yeah, that's fine. Thanks.

STENO

14:51 1 Q. Thank you, sir.

14:51 2 THE VIDEOGRAPHER: The time is 2:51 p.m. We
14:51 3 are off the record.

15:07 4 (A recess was taken.)

15:07 5 THE VIDEOGRAPHER: The time is 3:07 p.m. We
15:07 6 are back on the record.

15:07 7 BY MR. BRISCO:

15:07 8 Q. Thank you, Dr. Fowler.

15:07 9 Dr. Fowler, can you describe for me from a
15:08 10 metallurgical standpoint how wind can impact power lines,
15:08 11 such as the ones in this case, over time?

15:08 12 A. I can just tell you my experience where it
15:08 13 shows up, that if you have severe enough wind or
15:08 14 turbulence you can have minute movement, where the line
15:08 15 is in contact with a porcelain insulator and you can get
15:08 16 some wear at that location.

15:08 17 Q. Okay.

15:08 18 A. And I've seen occasions for -- with copper
15:08 19 conductors, where you can actually get a fatigue failure
15:08 20 of at least a strand at the location where it's -- it's
15:08 21 usually a tie wire that goes around the insulator and the
15:08 22 conductor sits in a saddle on top of an insulator.

15:09 23 Q. So how -- explain to me how that fatigue
15:09 24 failure can occur at the end of a conductor, such as the
15:09 25 one we have here? I mean, I'm picturing what you're

STENO

15:09 1 saying, kind of like a paper clip kind of moving back and
15:09 2 forth over time, and of course, initially there's no
15:09 3 break but over time that can wear at a connection point.

15:09 4 Is that what you're describing of the wear at
15:09 5 the insulator location?

15:09 6 A. No.

15:09 7 Q. Help me understand.

15:09 8 A. I was talking about copper conductors, but I've
15:09 9 also seen ACSR that has worn on the side, and you have an
15:09 10 abraded area on the side, where over a period of time and
15:09 11 relative movement you can get some wear, relatively light
15:09 12 wear, but still detectable wear on the outer side of some
15:10 13 of the strands, the aluminum strands.

15:10 14 Q. What does that mean, detectable wear? You mean
15:10 15 like you can see it, you can see broken strands?

15:10 16 A. Well, I can after, you know, after it's brought
15:10 17 down or I look at it visually or in the laboratory.

15:10 18 Q. But that wear that you're talking about is
15:10 19 occurring at the end of the conductor where it's
15:10 20 connected to the insulator?

15:10 21 A. Yes.

15:10 22 Q. And that -- and why is the wear occurring there
15:10 23 at that location as opposed to mid span for you?

15:10 24 A. Well, you have to realize that at an insulator
15:10 25 often the conductor will have sag on both sides of the

STENO

15:10 1 insulator. So you have tension force and bending force,
15:10 2 and even though they're low level, to the extent you have
15:11 3 relative movement, just minute relative movement of the
15:11 4 conductor relative to the insulator, you can get some
15:11 5 wear at that location.

15:11 6 Q. And what's bending force, is that the idea of
15:11 7 the conductor moving, bending back and forth at that
15:11 8 location?

15:11 9 A. Well, the answer is yes, but you know what
15:11 10 tension is when you pull on it, and bending would be,
15:11 11 imaging it going up over an insulator and sagging down on
15:11 12 both sides, and you have a little bit of bending force
15:11 13 there as well.

15:11 14 Q. Okay. So what's wrong with -- now I'm
15:11 15 offended. I like my paper clip example and you didn't
15:11 16 like it. Isn't that what's going on with the bending
15:11 17 force and the tension, that it's going back and forth
15:11 18 until it wears over time?

15:11 19 A. No.

15:11 20 Q. No?

15:11 21 A. A paper clip is a different mechanism. You're
15:12 22 grossly bending a piece of metal back and forth so that
15:12 23 it's a permanent bend in both directions. Nothing even
15:12 24 close like that happens to the conductor on an insulator.

15:12 25 Q. When you -- I skipped over the very beginning
STENO

15:12 1 today of walking through your work in this case. We
15:12 2 started with your retention July or August of 2023,
15:12 3 correct?

15:12 4 A. I believe I referred to a July 27th e-mail,
15:12 5 which was the first contact.

15:12 6 Q. Uh-huh.

15:12 7 A. And then I believe about six weeks later I
15:12 8 actually received -- you know what I received is that
15:12 9 information, that file that you went over just a few
15:13 10 minutes ago that had my notes on it.

15:13 11 Q. Oh, right. Okay.

15:13 12 And then at some point you did a site
15:13 13 inspection in this case, correct?

15:13 14 A. Right.

15:13 15 Q. Okay. When did that site inspection take
15:13 16 place? Was that the time of the transformer inspection?

15:13 17 A. The day before.

15:13 18 Q. Okay. So that was December 5, 2023, would have
15:13 19 been your site inspection?

15:13 20 A. Right.

15:13 21 Q. Okay. Who was present for your site
15:13 22 inspection?

15:13 23 A. You asked me that earlier. I identified Krsto,
15:13 24 Steven, Don Russell and Tom Fee.

15:13 25 Q. Okay. How long was your site inspection?

STENO

15:13 1 A. You know, I didn't time it, but it took us all
15:14 2 day to drive down there from Reno, do the inspection,
15:14 3 which I think probably lasted perhaps three hours,
15:14 4 possibly four, and then we drove back to South Lake
15:14 5 Tahoe. And basically, that took all day.

15:14 6 Q. But three to four hours actually on site
15:14 7 outside the Mountain View Barbecue?

15:14 8 A. Correct.

15:14 9 Q. Okay. And so why did you need to go, as a
15:14 10 metallurgist why did you need to go to the scene?

15:14 11 A. Well, it gives me good perspective to where the
15:14 12 poles are and the different buildings, eyewitness
15:14 13 locations. I wanted to measure the span and I wanted to
15:14 14 look at the -- I'll call them landmarks in order to
15:15 15 better understand where the conductor fell. I also
15:15 16 wanted to look at the relationship from the triplex to
15:15 17 the west pole and the service pole, because even though
15:15 18 it had been taken down it was restrung. So a variety of
15:15 19 reasons.

15:15 20 Q. Okay. Waiting for it to upload, I'm going to
15:15 21 mark as Exhibit 12 a document marked, "Scene Photographs"
15:15 22 in your file. I'm going to -- I'm going to share my
15:16 23 screen instead because the pictures are not oriented
15:16 24 properly.

15:16 25 All right. Okay, sir, this is a 36-page
STENO

15:16 1 document from your file, this Exhibit 12 marked, "Scene
15:16 2 Photographs." And do you see the Page 1 here on the
15:16 3 screen of Exhibit 12?

15:16 4 A. Yes.

15:16 5 (Exhibit 034-0012 marked.)

15:16 6 BY MR. BRISCO:

15:16 7 Q. Okay. And I'm going to scroll through them
15:16 8 slowly, but do you recognize this set of 36 pages of
15:16 9 documents in Exhibit 12?

15:16 10 A. Well, you've only shown me a few, but yes, I do
15:16 11 recognize them.

15:16 12 Q. I'm scrolling through them so you can see them
15:16 13 to verify it's the same document from your file that's
15:16 14 marked "Scene Photographs."

15:16 15 A. Yes. They all look the same.

15:17 16 Q. Uh-huh. I'm going to keep scrolling through
15:17 17 them so you have a chance to see them all.

15:17 18 And so these aren't -- you know, I can tell
15:17 19 from them but I just want to confirm. None of these are
15:17 20 your actual photographs, correct?

15:17 21 A. Correct.

15:17 22 Q. Okay. These are photographs that you compiled
15:17 23 from this case and that -- are these your notes?

15:17 24 A. Yes.

15:17 25 Q. Okay. I'm going to go back to the top, but if
STENO

15:17 1 you need to see the whole file let me know.

15:17 2 A. You know, I'm okay. Obviously, you're going
15:17 3 through the file that we scanned and labeled "Scene
15:17 4 Photographs."

15:17 5 Q. Exactly. Exactly.

15:17 6 And when you went to the scene did you walk --
15:17 7 can you describe for me the area of the scene that you
15:18 8 walked during your site inspection in December 2023?

15:18 9 A. Well, it would have been along 395, from about
15:18 10 the flea market up to the motel that's across from the
15:18 11 barbecue place. And then on -- obviously walked by the
15:18 12 barbecue place, some of the poles to the east and had --
15:18 13 and then through the gravel parking lot and out in the
15:18 14 field. The photograph you're showing is the burnt field
15:18 15 that had grown over with grass.

15:18 16 Q. Uh-huh.

15:18 17 A. And out in the field where the west end of the
15:18 18 north phase conductor came down.

15:19 19 Q. Gotcha.

15:19 20 And so this field that you walked in, when you
15:19 21 went it's three plus years after the Mountain View fire
15:19 22 was, what was the condition of the field when you went
15:19 23 out there? Was the grass still burned? Or what was the
15:19 24 condition?

15:19 25 A. No. The weeds had grown back, but like there
STENO

15:19 1 were a couple fence of posts there that show up in the
15:19 2 fire investigation photographs.

15:19 3 Q. Uh-huh.

15:19 4 A. One of them was there. The other one was there
15:19 5 but it had fallen down. And then through the scene
15:19 6 photographs we were able to locate the approximate
15:19 7 location where the end of the conductor landed in the
15:19 8 field, the end you just passed. Yeah, that end. We were
15:20 9 able to locate the approximate location of that.

15:20 10 Q. Okay. And this location where this, what we
15:20 11 were calling Item 2 of the north field conductor that
15:20 12 landed in the field, this side landed not on the gravel
15:20 13 side where Item 1 landed but it landed on the field side
15:20 14 in the actual field of grasses, correct?

15:20 15 A. Correct.

15:20 16 Q. When you were out there did you see Tom Fee
15:20 17 drop any fire indicator flags?

15:20 18 A. No, I don't recall any.

15:20 19 Q. And I believe you were saying a moment ago you
15:21 20 were able to identify the area in the field where this
15:21 21 north phase conductor on Page 6 of your Exhibit 12 scene
15:21 22 photographs, where that had landed in the field, correct?

15:21 23 A. Yes.

15:21 24 Q. Okay. And how did you do that, just using the
15:21 25 Cal-Fire photo that we see here in Exhibit 12, Page 6,

STENO

15:21 1 just kind of line that up with where you were standing?

15:21 2 A. Well, that and other photographs.

15:21 3 Q. Right. Okay. And when you were out there
15:21 4 three years after the fire, you said I think the
15:21 5 vegetation had started to grow back, or can you describe
15:21 6 for me the vegetation in the area where the line had fell
15:22 7 but three years later when you arrived?

15:22 8 A. Yeah. You know, I have photographs of it, and
15:22 9 some of them were scanned as part of your package, and
15:22 10 those scanned photographs will show the grass.

15:22 11 Q. Okay. I will -- yeah. I'll pull back up those
15:22 12 photographs and see them.

15:22 13 Was Dr. Russell and Tom Fee out there with you
15:22 14 the whole three to four-hour inspection?

15:22 15 A. I believe so. They were -- they didn't go
15:22 16 anywhere. I, you know, I was doing my work. I didn't
15:22 17 necessarily pay attention to all of what they were doing.

15:23 18 Q. Sure. Did they make any comments to you while
15:23 19 you were out there as to what potentially could have
15:23 20 caused the Mountain View fire?

15:23 21 A. I don't believe so, not at that time.

15:23 22 Q. Did they acknowledge that the power line was a
15:23 23 competent ignition source for the Mountain View fire?

15:23 24 A. I don't believe so.

15:23 25 Q. Did they ask you any questions as to whether

STENO

15:23 1 you believed the power line was energized when it
15:23 2 contacted the ground in this area?

15:23 3 A. Well, I don't know that they specifically asked
15:23 4 me that question. I believe by that point we all knew
15:23 5 that it was, at least until the recloser shut it down.

15:23 6 Q. Did any other -- in terms of inspections you
15:23 7 attended, we've talked about the December 5, 2023, site
15:24 8 inspection, and then the inspection of I think the
15:24 9 transformer the next day?

15:24 10 A. Yes.

15:24 11 Q. And the piece of sheet metal you looked at the
15:24 12 next day.

15:24 13 A. Correct.

15:24 14 Q. Okay. You told me before that was ruled out as
15:24 15 being related -- it's ruled out as it's unrelated to the
15:24 16 cause of the fire, correct?

15:24 17 A. Yeah. I didn't find a connection between that
15:24 18 panel and what I was seeing on the conductor.

15:24 19 Q. Okay. Any other site inspections that you
15:24 20 conducted, other than this December 5th inspection?

15:24 21 A. That was the day that I did the site
15:24 22 inspection.

15:24 23 Q. Okay. And then on December 7th you attended an
15:24 24 examination of the preserved conductors at EAG Labs?

15:24 25 A. Yes.

STENO

15:24 1 Q. And that was, December 7, 2023, was the first
15:25 2 time you personally saw the failed conductors, correct?
15:25 3 A. Except for the photographs, correct.
15:25 4 Q. Sorry. In person, correct?
15:25 5 A. Correct.
15:25 6 Q. So you obviously did not attend the Evans
15:25 7 inspection at Bureau of Land Management in September of
15:25 8 2021, correct?
15:25 9 A. Correct.
15:25 10 Q. And you did not attend the Evans inspection at
15:25 11 the Bureau of Land Management in January of 2022,
15:25 12 correct?
15:25 13 A. Correct.
15:25 14 Q. And then you didn't personally attend the
15:25 15 metallurgical testing of the evidence at EAG Labs in June
15:25 16 of 2023, correct?
15:25 17 A. That's correct. I just had photographs from
15:25 18 all those inspections.
15:25 19 Q. Okay.
15:25 20 A. But I wasn't personally there.
15:25 21 Q. If you had been involved in this case in June
15:25 22 of 2023 when the joint metallurgical destructive testing
15:25 23 took place, would you have personally participated in
15:25 24 that examination?
15:25 25 A. Wait. You are asking if I had been involved,
STENO

15:26 1 would I have been involved?

15:26 2 Q. Would you have attended, personally attended, a
15:26 3 destructive exam?

15:26 4 A. Well, if I had been retained before that date
15:26 5 and been asked to attend I believe I would have.

15:26 6 Q. Yeah. Do you know if defendants' prior
15:26 7 metallurgist, Jerry Zamiski, attended the destructive
15:26 8 testing at EAG Labs, as well as the two Bureau of Land
15:26 9 Management inspections?

15:26 10 A. He attended one of the BLM inspections and he
15:26 11 attended the lab examination.

15:26 12 Q. Do you know what his findings were from the lab
15:26 13 examination?

15:26 14 A. No.

15:26 15 Q. Why not call -- well, strike that.

15:26 16 Would it have been important to you to speak to
15:27 17 Dr. Zamiski about his findings following the destructive
15:27 18 testing in June of 2023?

15:27 19 A. No.

15:27 20 Q. Why not?

15:27 21 A. I was asked to examine the evidence and come to
15:27 22 my own findings.

15:27 23 Q. Do you know -- you know Dr. Zamiski from prior
15:27 24 metallurgical work?

15:27 25 A. Yes.

STENO

15:27 1 Q. Okay. Is he a well respected expert in the
15:27 2 community?

15:27 3 A. I believe he is.

15:27 4 Q. Were you prohibited from contacting Dr. Zamiski
15:27 5 to find out what his opinions were in this case?

15:27 6 A. No. In fact, on the 7th I called him, and even
15:27 7 though we didn't make contact I wanted some information
15:27 8 as to the orientation of some of the samples. And then
15:28 9 eventually the technician at EAG provided at least some
15:28 10 of that information and then assisted in laying them out.
15:28 11 So I didn't see the need to get that information from
15:28 12 Jerry.

15:28 13 Q. How about Dr. Kumar? You worked with Dr. Kumar
15:28 14 in this field on prior occasions?

15:28 15 A. Yes. I've known him -- I've known both of them
15:28 16 many years.

15:28 17 Q. It's a small community, so I figured you guys
15:28 18 all know each other.

15:28 19 Same question with Dr. Kumar, does Dr. Kumar
15:28 20 have a good reputation in the metallurgic community?

15:28 21 A. Yes, he does.

15:28 22 Q. And then same for Dr. Kumar's lab, EAG,
15:28 23 formerly known as SEAL Labs, is EAG and SEAL Labs a lab
15:29 24 that has a good reputation in the metallurgic community?

15:29 25 A. Yes, they do.

STENO

15:29 1 Q. So you've used the lab on various prior
15:29 2 occasions, fair to say, on other examinations?

15:29 3 A. Yes.

15:29 4 Q. So you have no reason to question the accuracy
15:29 5 of the data produced by EAG Labs or Dr. Kumar's lab in
15:29 6 this case, correct?

15:29 7 A. In this case I didn't find any reason to. If I
15:29 8 found a reason then I would ask him the question.

15:29 9 Q. Right. I think I'm about done, let me just
15:29 10 double-check some of my notes here, sir.

15:30 11 I don't have any further questions, sir. Other
15:30 12 than, do you believe we've covered all of your primary
15:30 13 opinions in this case and the basis for those opinions?
15:30 14 Obviously, you have your file here with your photographs
15:30 15 and documentation, but did we miss any opinions today?

15:30 16 A. I don't believe so.

15:30 17 Q. I don't have it in front of me but what we've
15:30 18 been doing is calculating -- getting the deposition time
15:30 19 on the record and then multiplying by your hourly, and
15:30 20 then asking if you can send an invoice to Krsto and Krsto
15:31 21 will forward it over to my office to have paid.

15:31 22 What is your hourly rate for depositions again?

15:31 23 A. \$500.

15:31 24 Q. Okay. And I'll ask the court reporter,
15:31 25 videographer if we can get a time for today's deposition.

STENO

15:31 1 THE VIDEOGRAPHER: One second. So we went on
15:31 2 the record at 9:25 and it's now 3:30, and we took
15:31 3 30 minutes for lunch. So that would be --
15:31 4 MR. BRISCO: I'm going to have you spot me five
15:31 5 minutes just for math's sake. 9:30 to 3:30 minus -- is
15:31 6 six hours, minus a half hour. So that's 5.5 hours times
15:31 7 \$500 an hour.
15:31 8 Krsto, I got that okay for you?
15:31 9 MR. MIJANOVIC: Yeah, that works out.
15:31 10 MR. BRISCO: Okay. Sounds good. So,
15:32 11 Dr. Fowler, if you can send an invoice to Krsto for that
15:32 12 amount, 5.5 hours times \$500, and then we'll get that
15:32 13 paid right away.
15:32 14 And then I appreciate your time in this case.
15:32 15 THE WITNESS: Okay. Thank you.
15:32 16 MR. BRISCO: Thank you.
15:32 17 THE VIDEOGRAPHER: All right. Madame Court
15:32 18 Reporter, do you need anything?
15:32 19 THE REPORTER: Expedites and roughs, the usual?
15:32 20 MR. BRISCO: Yes. For plaintiffs, yes.
15:32 21 THE REPORTER: Mr. Mijanovic?
15:32 22 MR. MIJANOVIC: Yes, please. Thank you.
15:32 23 THE VIDEOGRAPHER: All right. This completes
15:32 24 Volume I of the deposition of Gary Fowler, PhD, the time
15:32 25 is 3:31 p.m. We are off the record.

STENO

1 (Deposition concluded at 3:31 p.m.)

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

STENO

Declaration Under Penalty of Perjury

I, GARY FOWLER, the witness herein, declare under penalty of perjury that I have read the foregoing in its entirety; and that the testimony contained therein, as corrected by me, is a true and accurate transcription of my testimony elicited at said time and place.

Executed this _____ day of _____ 20__

At _____, _____
City State

GARY FOWLER

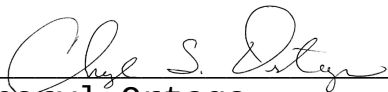
STENO

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

I, CHERYL ORTEGA, Certified Shorthand Reporter for the
State of California, do hereby certify:

That the proceeding was taken by me in machine shorthand
and later transcribed into typewriting, under my
direction, and that the foregoing contains a true record
of the testimony of the witness.

Dated: This 19th of February, 2024 at San Bernardino,
California.


Cheryl Ortega
CSR NO. 13709

ERRATA SHEET
CHANGES IN TESTIMONY
MOUNTAIN VIEW FIRE CASES
GARY FOWLER
February 19, 2024

	Page	Line	From	To
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24	SIGNATURE :		DATE :	
25	GARY FOWLER			

Exhibits	034-0003 16:14	118 36:6 40:17	178 84:2
	034-0004 17:11	11879 131:11	179 84:2
Exhibit 034-0001 6:8 11:10	034-0005 38:18	119 99:13	17th 25:4
Exhibit 034-0002 6:9 15:8	034-0006 45:3	1195 31:5,10	181 114:22
Exhibit 034-0003 6:10 16:14	034-0007 46:6	11:35 72:20	184 114:22
Exhibit 034-0004 6:11 17:11	034-0007-A 48:13,16	11:50 72:23	186 114:9 138:17
Exhibit 034-0005 6:12 38:18	034-0008 51:18	11:55 24:3 25:10 61:13, 17,23 77:6	189 118:7 119:9,22
Exhibit 034-0006 6:13 45:3	034-0009 109:1	11:59 79:7	19 7:1
Exhibit 034-0007 6:14 46:6	034-0010 133:1	12 79:10 81:8,10,11,12, 24 82:14,15 145:21 146:1,3,9 148:21,25	19th 7:10
Exhibit 034-0007A 6:15	034-0011 139:25	1200 133:18 134:6,11, 15,20 135:1	1:03 90:10
Exhibit 034-0008 6:17 51:18	034-0012 146:5	1215 31:5	2
Exhibit 034-0009 6:18 109:1	034-007 48:9	122 106:16 112:8	2 11:8 15:1,12 16:3 34:4,6,12,21 35:2,3,18 37:5,18,21 38:3 39:24 40:17 41:9 44:2 45:23 47:21 50:24 51:23 52:1, 18 54:25 55:7,18 57:18, 20,21,23 58:7,11 59:1 68:11,25 79:14 80:11, 15 83:19 89:16 90:16, 19 91:1 148:11
Exhibit 034-0010 6:19 133:1	1	126 117:15 121:18	2,360 131:9
Exhibit 034-0011 6:20 139:25	1 11:8,13,18,24 12:12 23:6 24:12 28:15 34:4, 6,12,17,19 35:3 40:7,17 54:25 55:7 57:16 71:3 73:3 82:24,25 83:3,15 84:10 90:1,16,19 93:2, 18 94:13 98:24 99:14 101:14 103:23 106:4,18 108:5,8 146:2 148:13	127 121:2	20.5 80:5
Exhibit 034-0012 6:22 146:5	1,000 134:2	12:24 90:6	200 52:13
\$	1,220 31:3	135 23:14 40:11	2020 17:15,25 23:10 25:4
\$500 154:23 155:7,12	1,700 132:18	1350-H19 131:5	2021 151:8
-	1,705 134:4	14 84:11,13,19 85:24 86:13 87:16	2022 63:1,4,6 151:11
-000- 7:3	10 131:13 132:23 134:4	15 35:22 37:8 41:2 51:23 53:16 87:22	2023 14:11 35:24 36:9, 18 44:23 62:14,17 144:2,18 147:8 150:7 151:1,16,22 152:18
0	100,000 131:7 132:5	15-page 108:21	2024 7:1,10
0007 50:18	1052 44:5,16,22	156 67:21,24	226731 23:8
001 131:9	1053 45:5,8	159 51:15 53:10 54:12 55:4,11 56:11 64:16,18 66:13,24 68:6 69:16,25 71:18	23 106:4,5
034 48:12 50:14,15	1054 45:17,23 46:20	16 51:24	2360 132:21
034-0001 11:6,10	109 41:9,15	16-page 132:25	24-page 139:18 140:2
034-0002 15:8	10:30 43:19	16.4 52:5 54:7	26 31:8
	10:43 43:22	165 67:20,25 68:2,9,17, 25 69:16,25 71:18	2700 31:8
	11 139:16 140:3,8,13	17 23:10,15 54:19,24 55:1,22 57:12 69:5,7	27th 14:8,11 144:4
	110 99:5	1705 134:8	
	112 115:22,24	175 41:17	
	113 99:8		

2:02 123:22	25 125:5,19	25:10 43:19,22 61:13, 17,23 72:20,23 77:6 79:7	admonitions 10:24
2:19 123:25	5228 7:14		advancement 108:9
2:51 141:2	597 134:8	abbreviated 40:19	advised 14:18 63:3
	5th 62:14 150:20	ability 46:4 47:12 86:7	agree 32:9 55:2 81:2 94:16 96:25
3		abraded 142:10	agreed 98:10
3 11:8 12:12 16:11,12 22:22 23:6 39:20 42:21, 22 73:3 79:13 82:18 91:8 105:24 129:24 133:5 134:4	6	abrasions 83:5,14,16	ahead 34:9,14 50:7
30 131:13 155:3	6 15:4,11 44:21 92:19 95:12 148:21,25	absence 74:1	air 31:21 38:8 59:21 94:3 110:15 121:14 122:21 123:2,5,9 124:5
300-foot 131:10	600 111:19 134:12	Absolutely 75:5 85:11	
304 23:23	6th 62:14,15,17	accelerates 105:22	Alex 9:25
304-foot 131:2		accompanying 86:14	aligning 36:19
34 11:5,8,9	7	accuracy 154:4	allegation 19:22 20:14
34334 23:8	7 44:23 46:2,20,22 47:19 48:22 49:11,14 130:20 151:1	accurate 15:23 93:25	allegedly 92:5
35 133:21	7-A 50:2,5,22 53:8 55:3, 11	accurately 24:5 131:20	allowed 100:15
36 146:8	7/1 131:8	acknowledge 131:24 149:22	allowing 128:24
36-page 145:25	7th 35:20 36:18 44:7 150:23 153:6	ACSR 18:18,22 19:2,6, 8,11,13,23 20:10,20 23:7 25:2 31:4,10 57:14 109:9,11 120:4 121:24, 25 122:16 128:15 130:22 131:2,8,14 132:4,20,24 135:17 138:20 142:9	alloy 114:6 115:6
395 147:9		act 129:21	alloying 113:20,22 114:21 115:1,9,14,19
3:00 140:23	8	acting 128:2	alteration 111:9 134:17
3:07 141:5	8 51:11,15 64:17 67:20 80:3 84:11 86:13 93:16 135:8,9	action 7:7	altered 106:15
3:30 155:2,5		actual 71:16 80:22 92:7 96:4 100:9 125:13 146:20 148:14	alternative 86:11
3:31 155:25 156:1	9	add 45:21 53:11 56:25 134:6	alters 111:25
	9 16:25 108:18,19 111:3 121:21 122:15	adding 134:1	aluminum 26:24 31:1, 2,3 43:10 52:15 54:18 56:12,14 69:5 70:9 76:4,9 84:14 86:25 87:1,6,16 88:1,6,15 91:12 93:1,18,22 96:11 98:23 99:3,9,14,24 100:11,16,19 101:7,14, 15 102:10,22 103:3 104:10 106:11 107:8 109:8,10,12 114:7,16, 21,23 115:1,7,14,16,18, 25 116:10,12,15 117:8, 12,18,21,24,25 118:4, 17,24 120:21 121:2,24 122:5 131:3,5,13,14 132:14,15 133:12,16,19 134:7 136:5 138:17,22 139:9 142:13
4		address 28:9,11 29:5,8 79:19	Amanda 8:4
4 17:8,9,20 18:17 20:19 91:7 92:20 101:25 129:25 131:8	9.5 80:5	addressed 29:3,18 127:3,18	ambient 136:5
46 131:10 132:19	95 127:15	adjacent 27:4 100:3,8 107:10 115:18 118:24	
	97 94:12 95:2 97:22		
5	99 93:11,15		
5 15:11 38:16 39:1,9,11 40:25 42:3 92:17 105:23 130:1,2 144:18 150:7	9:00 16:9		
5,000 30:18 31:11	9:25 7:2,10 155:2		
5.5 155:6,12	9:30 155:5		
50 23:24 73:4,18 74:3, 17,23 75:2 124:22,24,			
	A		
	a.m. 7:2,11 16:9 24:3		

American 8:20	12,16,24,25 28:3,6,13, 22 29:15,20,25 30:5,12, 14,17 31:11,14,24 33:11 35:10,11,12,14, 18,21 37:1,5,13 40:22 44:1,4,24 45:10,24,25 47:18,20,24 48:25 49:10,12 50:4,21,22,24 53:7,9,15,22 54:3,8 55:2,15 57:24,25 65:2,4 66:21 67:8 80:4 85:12, 18,25 86:4,15 87:4,5, 12,17 88:9,10,16 102:18 104:6 105:4,7,8 106:12 116:19,22 117:7,25 118:1,23 119:8,12,13,16,17,21 120:6,8,10,16 126:4,11, 22 135:11,15,19 137:20 138:22	16,22,24 104:6 105:8, 14 106:6 107:5,10 114:6,15,23 115:4 116:14 117:5,17,20 118:12 119:3,14 120:20 121:6,11 124:6 130:2, 10,13 131:19 133:12 135:13 137:8 138:2,17 139:4 142:10 147:7 148:20 149:6 150:2	attorneys 7:8 14:16 26:17 attributed 38:4 August 144:2 aviation 20:21,23,25 aware 28:5 32:16 63:12 68:21 70:18 73:13,23 74:8 81:4 89:4 111:6 awhile 43:9 60:23 71:17 83:7
amount 26:25 102:14 121:23 139:3 155:12	areas 16:6 23:18,20 45:18 49:10,12,18 55:4, 17,24 57:11 67:8 69:17 71:17 85:1,6 105:9 124:4 126:4,11,14 135:12 136:15 137:20, 23 139:2	B	
analogous 107:9	arid 27:16	back 17:14,24 36:1,23 37:1 43:23 48:24 50:15 57:6 61:4 64:10,15 65:19 67:25 71:3,12 72:24 78:15 79:11 81:7 84:8 86:19 90:11 100:21 107:21 124:1 136:14 137:19 138:4 140:23 141:6 142:1 143:7,17,22 145:4 146:25 147:25 149:5,11	
analysis 29:23 31:18 33:5 95:6 138:11	arrived 149:7	balance 38:5 barbecue 33:21 90:21 145:7 147:11,12	
analyze 59:15 123:18	article 28:9 95:13 108:4,6,13,21,23 109:4, 7,22,24 110:2,9,19 111:1,2,3	Baron 9:1	
analyzed 24:2 60:5 75:25	articles 28:5	based 56:2 60:19 61:18 64:9	
Angeles 7:14 13:18	artifact 100:3	basic 113:21	
annealing 106:1	ASM 108:21	basically 145:5	
anneals 112:1	assisted 153:10	basis 23:1 24:11,13,24 25:4 80:10,13 82:23 83:2 135:23 154:13	
annotate 46:5,8,12	assume 65:6,23	Bauman 9:15	
annotated 48:6 50:8	assumed 66:9	beach 95:15,18 97:8 98:3 106:9,11,13 108:11	
answering 32:14	ASTM 133:11	Bear 136:13	
anticipated 20:1	atmosphere 104:11, 15,18,22	beginning 17:24 88:3 143:25	
apologies 61:13	attach 51:11 108:12	begins 107:4	
apologize 38:1 61:6	attached 40:1 57:18 80:2 131:17	behalf 7:24 8:5,9,16 9:7,10,13,16,19,22 10:1 18:6,7	
apparently 82:21 83:13	attacked 80:23		
appearance 26:10 27:1,2,6,10 95:15 97:7, 25 103:9 105:13 106:7 122:11	attempt 36:16		
appearances 105:12 108:6,21	attempted 36:18		
appears 57:16	attend 151:6,10,14 152:5		
applied 83:12 113:1 130:22 131:3,7,9 132:18,22	attended 150:7,23 152:2,7,10,11		
apply 122:7	attention 149:17		
approach 111:20	attorney 7:16,18,19,23 72:7		
approaches 97:12			
appropriately 38:25			
approximate 61:16 77:8 148:6,9			
approximately 10:20 23:14 24:3 25:10 41:15 53:10 54:10 61:13 74:23 80:3 131:6 136:24			
arc 26:5,8,12,20 27:3,5,			

believed 150:1	48:2,14,17 49:2 50:13	calculating 133:8	caused 23:16 24:1
bend 143:23	51:19 65:11,14,19 66:5	154:18	25:14 29:21 32:7 49:23
bending 143:1,6,7,10, 12,16,22	72:12,17 73:1 77:22,23	Calculations 133:7	50:25 56:9,13,16,19
benefit 28:19	78:24 79:5,12 90:12	California 7:13 21:23	62:5 64:18,21 68:16
Berger 8:8	97:16 98:9 109:2 124:2	22:2,9 27:15	73:5 78:3 79:17,24
Berkeley 29:9	133:2 140:1 141:7	call 12:23 19:3 36:16,23	84:22 85:24 86:16
bigger 67:2	146:6 155:4,10,16,20	55:9 94:2 97:23 98:25	88:23 89:1,14,21 91:24
Bill 10:3	brittle 106:5,7 118:12	145:14 152:15	97:3 102:2 121:25
binder 95:13	broadly 21:6	called 36:21 153:6	122:16,20 125:1 126:22
bird 84:8 121:18,20,21, 25 122:4,7,10,15,19	broke 19:23 20:10 94:6, 24 111:13	calling 148:11	130:12 149:20
123:4,8,11,13,15	broken 86:1 88:1,6	camera 64:9	causing 18:19 25:21
bit 49:6 78:23 105:14,15	117:19 120:19 126:16,	capable 32:13 37:21	33:2 128:20
113:6,21 122:24 143:12	23 132:15 135:12,16	38:8 129:1,2	cautionary 115:3
bite 78:23	142:15	caption 52:15	center 23:7,17,19,23,
black 80:20 84:14,23	brought 20:3 21:1	captions 33:8	25 24:14 25:2,12,22
85:23 86:15,16 87:11, 18	68:22 78:13 138:7	car 63:2,3,5	28:20 29:6,14 30:13,15
BLM 152:10	142:16	carbon 31:8	33:24 38:6 39:4,17,19,
blob 56:10 65:7 66:24 67:2	brown 80:20,23 81:6	career 10:21 18:9	22 41:24 42:16,17
blobs 68:8,16 69:15	brush 47:15	careful 114:17 120:23	56:23 57:9 73:5,10,19
blown 130:15	bubbles 93:24 94:3	Carlos 29:12	85:25 87:12 88:19
bottom 81:17,18	bubbling 93:22 94:16	carries 131:11	92:23 124:13 125:14
133:17	99:5,9 101:4,15	carry 86:8 131:15	126:1,19 127:13
Boy 125:16	Budd 9:1	case 7:12,14 11:13	135:12,15 136:17,18,22
branch 20:14 78:17	Buhlert 7:6	12:13,17 13:8,19,22,25	137:3,4 138:23 139:22
break 41:5 43:15 72:18, 19 87:6 89:24 90:1 94:6	buildings 145:12	14:7,19 15:25 19:1,3,13	certainty 20:10
123:20 124:23 125:10, 20 133:15 140:20 142:3	bullet 16:17 23:11	20:18,22,24 21:8,13,16	cetera 11:8 12:14
breaking 72:1 112:23	92:20 102:1	22:2,10,17,24 27:12	chance 51:4 146:17
131:8 132:21	Bureau 151:7,11 152:8	29:7,18,23 30:8,11,25	change 27:10 43:13
breaks 118:15 124:25	burn 67:9 84:14,23	32:2,4,7,10 33:6,18	103:10 106:2
brevity 54:23	burned 147:23	34:5,7 36:17 38:12	changed 127:23,25
briefly 71:12	burning 103:21	46:17 47:21 57:7 60:1,4	128:10
bring 49:14 69:7 84:8	burnt 147:14	62:10 77:2,17,25 78:3,	characteristic 106:8
Brisco 7:17,19,20		13 86:9 90:22 113:2	122:11
10:14 11:11 15:9 16:15	C	128:5 138:6 139:6	characteristics 27:19,
17:12 38:19 43:24 45:4	Cadieux 9:5,6	141:11 144:1,13 146:23	21 95:2
46:7,10,13,15 47:14	caging 84:8 121:18,20, 21,25 122:4,7,11,15,19	151:21 153:5 154:6,7, 13 155:14	characterized 27:20
	123:4,8,11,14,15	cases 7:12 18:1,5,18	check 14:4
	Cal-fire 24:19 66:20	19:7 20:4,19 22:19 30:2	Cheri 10:7 65:19
	67:10 84:1 148:25	32:4,25 33:3	chunks 24:8
	calculated 133:12	Casualty 8:21	circle 47:17,24
		categories 15:24	circled 47:19 50:22
		caught 78:25	53:8
		causation 15:17	citing 82:22 131:9,10
			claims 18:23
			clarify 27:22 34:5 50:21

clash 38:5,8 57:10 68:18,19 73:25 74:8	complicated 26:24	150:18	contacts 32:3
clashed 91:10 135:15	compound 114:17 115:5,12	conductors 15:16 20:12,14 23:17,25 25:3, 5,7,14 26:7,11 28:21 29:7,14 30:15 36:20 37:24 57:11 59:6,20 67:16 70:2 71:23 73:5 78:16 89:6,13 91:10 96:20 109:19 120:3,4, 12 124:10 126:17,19,23 127:8,10,20,23,25 129:8 135:13 141:19 142:8 150:24 151:2	contemplating 89:23
clashing 23:22 24:1 56:15,17,21 57:4,10 68:22 73:6,9,23	comprehensive 16:5	confirm 38:4 56:6 91:2 115:11 135:9 146:19	contemporaneous 26:13
clean 91:6	concept 60:25	confirmed 36:14	content 31:8
clear 49:14 84:6 88:4	conclude 95:5	confuse 34:11	context 87:8 92:2 102:17
clearance 82:9	concluded 33:3 156:1	connected 34:17,19, 22 91:1 142:20	continue 118:1
clearing 82:4,6	condition 15:15 19:6 122:7 147:22,24	connecting 33:24 40:8	continues 58:9
click 46:24 47:2,7,11 48:6 49:11	conditions 15:17 20:17 23:9 24:17 25:3 27:9 124:7 130:23	connection 89:12 142:3 150:17	contracted 7:6
clip 142:1 143:15,21	conducted 135:17 150:20	consideration 19:15	contraction 107:5 122:21,23 123:1
close 86:19 87:13 89:24 143:24	conductive 119:2	consistent 25:10,15, 21 38:3 59:2 61:24 74:5,17,18 121:9,10	contributing 69:17
closer 30:22 53:22 54:12 57:23,25	conductor 18:19 19:2, 8,14,16,18 20:20 23:7, 13,16,19,21,22 24:1,14, 15 25:12,21,22 26:14 27:4 30:13,21 31:4 32:1,6,9,17 33:1,2,11 34:7,18,22 35:1,6,24 36:3 37:7,18 38:5,6,7 39:4,6 40:1,23 42:2,3, 17,19,24,25 43:2 44:1 49:25 55:4,18 56:2,15, 16,19,20,22,23,24 57:4, 8,10,14 58:7,13,15 63:15 64:3,22,25 65:3 66:12,13 67:7 68:18,19, 21,23 70:12 73:6,9,23, 25 74:8 78:10,11,13 79:15,18,22,24 80:1,5, 19,21,22 81:2,5,17,21, 24 82:3,19,21 83:5,15 84:2 85:2 86:20 88:19, 24 89:5,15 90:17,21 92:10,23 96:10,14,19 107:15 109:9,11,16,21, 23 110:5,10 114:5 117:20 120:14 121:16 122:1,17,20 123:2,4,11, 12,18 124:5,6,14 125:15 126:2 127:14 129:21 130:3,22 131:2, 4,10,16,18 132:4,18,19 135:18,20 136:17,19,21 137:3,15 138:9,13,19, 23 141:22,24 142:19,25 143:4,7,24 145:15 147:18 148:7,11,21	constructed 127:15	control 27:15
closest 33:21		construction 131:14	conversation 13:24
coated 116:5		consult 14:15	conversations 76:21
coiling 121:10		consultant 13:21	conversely 135:6
collected 15:16		contact 23:9 25:3,13 26:14 28:20 31:24 35:7, 13 37:22 38:3 44:2 50:25 55:5,7,8 58:2 59:8,9 61:25 64:6,19, 22,25 66:3,24,25 67:3,5 70:19 75:12 78:10,15 80:6 85:24 86:10 87:12, 13 120:13 129:13,20 137:6,22 141:15 144:5 153:7	convey 92:14
Colorado 21:19 22:18		contacted 14:8 25:5 33:1 37:19 57:24 58:5 80:1 91:1 150:2	copper 27:1 109:19 141:18 142:8
coloration 27:3,4		contacting 25:21 32:17 37:14 40:23 44:2 50:24 58:15 59:8 63:15 64:4,23 67:13 153:4	copy 28:17 38:20,24
combust 82:7			core 31:1 54:18 57:12, 13 69:5,6 70:8,14,16 86:25 91:11 93:4,6 101:22 105:24 106:4,17 107:15,20,22 108:2 109:21,23 110:5,10,13, 14 111:7,10,11,15,16, 25 112:5,6,18,24 113:2, 4 114:4,11,20,24 115:1 116:5,10,15,20,23 117:4,8,9,13,19 118:1, 3,7,9,15,19,21 120:17, 19 121:24 131:1,6,11 132:3,9,11,13,16,17,20 134:1,2,7,11,13,20,25 135:5,6 138:13,14,19, 23 139:2,8
combustible 31:12,22			corner 48:7
comingle 113:24			correct 10:18 17:15,18 18:4 20:6 21:2 26:1 32:8 33:6,22 34:19,23, 24 37:15 39:21,23 40:13 44:11,17 48:12 50:5 51:1,7 53:23 54:9, 13 55:6,13,16,20,25
comments 149:18			
commonsense 29:24			
communication 21:19			
communications 22:18			
community 153:2,17, 20,24			
company 21:19 22:18			
competent 28:23 29:2, 7,22 32:2,10 149:23			
compiled 146:22			
complete 113:17			
completes 155:23			
compliance 127:15			

62:21 66:17 68:3,6,9,
13,14 74:15 75:3,18
79:25 83:17,20 87:8,19
90:22 91:5 92:24 93:5,
19,20 94:9 97:22 98:4,
5,11 99:6 100:1,12
103:3 107:23 115:2,25
116:3,6 120:22 122:18
124:14 125:1 129:3,5
130:3 134:4,24 135:7,
10,24 144:3,13 145:8
146:20,21 148:14,15,22
150:13,16 151:2,3,4,5,
8,9,12,13,16,17 154:6

corrected 17:3

Correction 92:19

correctly 131:23

correspond 36:2

correspondence
12:14

counsel 16:9,22 72:6
77:20,24 78:2 140:15

County 7:14

couple 57:3 80:14
148:1

court 7:13 10:7 78:25
154:24 155:17

cover 16:6

covered 71:6,8 80:12
91:20 96:12 130:20
135:24 136:14 154:12

Cozen 7:20 8:12,23

crack 86:21,22 95:17
106:7,8 108:9 132:10
137:23 138:2

cracks 106:6 118:13

Craig 8:8 47:23,25
77:19

create 69:21 70:1 97:5
137:23

created 21:2 23:16
28:22 57:24 63:16,17
91:14 94:24 95:16
102:1 106:7

creates 100:4 123:13

creating 20:15 130:15

crushed 66:10

current 86:6,8,11,24
87:21 110:18 135:18

cursor 49:4 134:3

custody 26:9

cut 23:15 35:22,25
36:1,6,20 37:8 39:5
40:17,24 41:2,8,25
51:24 52:11 80:5 81:9,
11,12,14,15,16,18,20,
25 82:5,15 86:5 136:9

cutting 113:19 122:24

cyclic 131:3,7 138:1

cycling 97:4

cylindrical 108:8

D

damage 21:2 23:16
26:3,5,8 27:3,5,6,16
28:13 45:13 49:20,23
55:21 56:23 57:17,24,
25 63:12,13,14 66:21
70:12,23 82:20 83:3,8,
10 84:7,24 85:1 89:13
96:13 109:13,18 117:7,
25 118:1,19 119:9,16,
21 121:9,15 122:9
130:6,13,16 135:14
138:18

damaged 109:20
123:13 138:2,14

Dana 8:12

dark 80:23 81:6

darkish 80:20

dash 50:18

dashes 39:16

data 24:2 25:19 57:1
59:22 60:8,9 61:7 63:25
64:2 70:20 75:11 77:3,4
124:19 139:17 140:10,
12,15 154:5

date 27:12,22,23 41:21
43:10 63:5 128:7,11
152:4

dating 27:14

David 7:17,20 77:19

day 24:18 25:5 26:14
28:21 59:13 63:10,18
68:19,22 73:9,19,23
74:4,6,13,18 104:7
112:14 144:17 145:2,5
150:9,12,21

deal 110:5

dealing 26:17 30:25

deals 110:7

debris 78:6,9

December 35:20 36:18
44:7,23 62:14,15,17
144:18 147:8 150:7,20,
23 151:1

declines 97:13

defamation 122:12

defend 22:1,3

defendant 13:21 16:22
18:8,13,15

defendants' 76:21
152:6

defending 7:22 21:14

defense 15:1 16:8
18:6,11

defer 25:18

definition 137:18

definitively 126:18

deformation 121:2,5,
15

deformed 83:12 121:6
122:6

degree 104:8 111:8

degrees 134:6,20

delay 11:23

delays 11:2

demonstrates 71:20

Denenberg 8:20

depending 28:12 31:8

depends 103:16 104:9
111:18 129:12 137:24

depicted 51:14 68:24

depo 23:3

deposed 10:17

deposited 66:10

deposition 7:11,15,17
11:4,13,25 12:2,11,23
13:6,8 15:1 16:10,11
17:6,14,18 18:2,10 21:5
22:23 34:3 38:17 51:5,
10,12,16 58:22 59:4
64:17 82:22 90:14
102:17 154:18,25
155:24 156:1

depositions 10:24
13:2 18:17 24:19 26:16
154:22

deposits 116:2,9,24

describe 56:10 80:18
83:10 87:25 88:5 91:17
102:7 109:7 113:21
141:9 147:7 149:5

describes 109:5,24

describing 59:6 142:4

description 107:24

descriptions 24:17

designated 15:19

designation 15:2 16:3

destroyed 96:1

destructive 151:22
152:3,7,17

detail 93:14 99:20

detailed 31:18

detectable 142:12,14

detector 76:10,14

determine 29:20 89:7

detour 66:22

developed 109:13

develops 112:25

diameter 106:3 107:4,
6,11 133:10 138:16

difference 136:4

differential 85:21

86:12 87:3,21 119:4	39:1,7 41:7 49:9	EAG 44:23 150:24	23 106:18 111:13
differently 119:11	108:17,19 132:24,25	151:15 152:8 153:9,22,	112:12 114:20,24 129:7
digit 50:12	133:11 139:16,18	23 154:5	131:16 141:24 142:19
dimension 54:17	140:2,5,7,9 145:21	earlier 17:17 39:25	147:17 148:7,8
dimensions 36:5,8	146:1,13	43:25 50:23 62:1 80:9	ends 23:19 42:7 53:4
38:16 39:2 40:20	documentation 74:2	84:25 98:10 102:16	85:21 86:8 87:3 88:7
diminishes 111:21	154:15	119:5 124:12,21 144:23	93:7 102:22 114:4,6,11,
direct 31:24	documented 50:1	ease 54:15	12 116:20,23 124:8
directed 102:18	documents 12:1 146:9	easier 45:6	energized 31:23,25
directing 126:24	Don 24:2 61:15,19	east 23:8 34:15,19	32:3,6,9,16 33:1 37:14,
direction 46:24	70:17 73:14 75:10	39:3,15 40:9 43:3 81:17	18 50:23 65:3 67:1
directions 143:23	87:14 135:2 144:24	82:18 93:2 117:17	83:15 110:15,20 150:1
directly 130:17,18	double-check 154:10	147:12	Energy 22:14
dirt 67:14	doubt 110:22	easternmost 33:20	engineer 13:17 22:5
discoloration 27:8	download 11:17	easy 11:21	enlargements 53:2,3
56:2 80:20,24,25 81:6,	dozens 21:11 22:6	eat 78:23	entire 12:13,17
12 89:15	draw 47:13 49:11	Edison 21:23 22:2,9	entitled 38:15 39:2
discolored 79:16,22	drawing 129:24	EDS 115:21 116:24	Entity 9:2
81:9,11 82:6	drive 145:2	educate 136:4	environment 27:16
discoloring 80:17,18	driven 82:21	eight-page 11:25	102:12 104:9
discolors 103:22	drop 58:8 59:2,9 61:25	ejected 76:5	equals 131:13
discuss 109:22 110:19	63:15 64:4,6 75:17	elastic 131:12	equipment 127:7
111:4	90:25 91:3 108:17	electricity 85:17,19	erase 106:12
discussed 12:5 31:10	148:17	87:2	Eric 8:15,19
50:23 61:25 78:8	dropped 134:8	electron 27:7 105:16	establishing 29:10
discussing 47:20	drove 145:4	element 114:8,14	estimate 21:10 63:24
discussion 54:16	DSCN 44:15,16 45:8,	elements 113:24,25	82:16
61:18 65:10 71:11 72:5	17,23 46:20	elevate 133:18	estimated 23:24 73:4,
78:4,21 102:16	DSN 44:22 45:5	elevated 91:14,23	18
discussions 25:8	ductile 107:2	102:1,12 103:10,11	evaluate 63:22
78:6,7 130:21	ductility 97:13 111:21	105:21 133:22	evaluated 62:3 73:14
dispense 10:23	due 19:14 72:18 79:16,	elevates 102:9	Evan 8:10
displace 78:11	22 80:17 81:6 88:7 91:9	elongating 128:21	Evans 151:6,10
displaced 121:22	92:3 105:25 106:2,3	emit 59:9	event 29:2 30:1,6,12
distance 37:4 40:14	109:14 129:8 131:12	emitted 29:15	31:21 75:17 85:24
53:9 54:3 81:8 136:22	135:14	emphasize 75:10	88:10 95:3 96:3 102:8,
distinguished 41:23	dull 27:1 105:12	employee 7:8	15 104:4,7,24 105:2
distortion 97:2	duly 10:11	encapsulated 23:12	116:8 122:13 124:13
document 11:16,17		end 14:4 43:3 46:13	126:22 129:4,11,17
12:1,8 15:6,11 16:8,10,	E	55:15 67:7 79:14 80:3,5	events 57:7 63:10 69:9
19,21 17:2,4,7 38:14	e-mail 139:19 140:9	81:7,10,14,15,18 82:7,	70:16 74:24 80:9 117:4
	144:4	15,19 95:17 98:14,16,	125:14 138:8
			eventually 27:17 153:9

everybody's 111:1	106:1 107:18 108:18,19 109:1 111:3,12,16 112:5,6,18 113:4 122:4 129:24 130:1,2 132:23 133:1 134:4 135:19 139:16,25 140:3,8,13 145:21 146:1,3,5,9 148:21,25	extent 102:25 117:14 129:20 137:24 143:2	133:18 134:11,15,21 135:1
evidence 15:16 19:5, 10 20:13 22:4,6 23:6 24:13 25:11,23 26:8,11, 14 32:22 33:2,10 35:5 38:2 39:20 62:20 63:8 69:11 71:15,16 74:16 78:15,18 80:13 88:20, 22 95:22 96:4,6,21 98:2,11,18 99:4 100:4,9 105:10,16 106:12 114:15,20 115:13,19 120:5 121:15 122:8 124:16 126:17 135:11 136:18,20,25 137:7,14 138:4 151:15 152:21	exhibited 23:20 91:13 92:6 111:15 135:14	exterior 104:21 105:13, 19,20 118:4	fatigue 19:9,10 85:9 86:14,21,22 92:4,5,6, 15,16 95:10,11,15,16, 18,22 96:2,4,11,21 97:4,5,6 98:3,11,13,18 106:8,10 107:14,21,22, 25 108:1,6,20 109:5,8, 12,17,19,22 110:5,7,23 111:4 124:9 130:9,21 131:5,6 132:3,10 137:23 138:3 141:19,23
exact 61:15 69:12	exhibits 11:7 46:4,17 91:11,22 92:21 95:18 117:10 138:15	extra 134:9	
exam 36:9,20 152:3	expect 66:3 67:2 70:24 96:13 103:14,19 104:5 108:2 111:6	eyewitness 145:12	
examination 10:13 24:13 33:7 35:16,24 80:13 89:9 150:24 151:24 152:11,13	expected 11:21 15:12, 18	F	
examinations 154:2	Expedites 155:19	facility 62:18	
examine 22:4 89:11 152:21	expel 28:25	fact 99:19 114:20 153:6	
examined 19:5 33:11 42:22 78:14	experience 28:4 29:25 64:24 65:3 67:15 86:14 95:21 105:9 123:4 141:12	factual 82:2	
exceed 112:23 113:1 134:14	experienced 23:9 25:3 26:16 57:9,17 82:20 83:3 104:24 105:2 134:13	factually 91:23	
exceeds 130:22 131:7 132:8,21	expert 12:13,18 15:2 16:3 18:2 21:6 77:25 136:1 153:1	fail 117:5	
excess 134:20 135:1	expertise 15:20 31:19 38:9	failed 19:8 34:18 52:15 70:16 81:10 85:7 99:8, 13 102:22 106:18 107:22 115:18 116:20, 23 118:3,5,24 137:9 151:2	fault 24:3 25:10,14 57:1 60:10,11,14 61:3,8,14, 17,20 64:5 74:9 77:7
excuse 90:18 125:11 132:10	experts 15:19 76:22,23 77:21	failure 18:18 35:17 37:3,5 51:25 53:23 54:12,14 68:12,25 69:1, 12 71:16,18,20 85:10 86:14 92:25 93:18 94:11,14 95:3 98:23 99:9,14,24 101:14 102:23 103:15 107:15, 21,23,25 110:20 111:11,12,16 114:6 116:8 117:5,18 120:20 124:9,22 130:10 134:7 137:8 141:19,24	faults 24:4 60:16 73:13 77:6
exercise 49:8	explain 57:6 110:2 138:8 141:23	fair 10:24 26:19 60:21 74:1 76:12 77:22 99:23 103:25 125:11 126:18 129:1 132:12 154:2	feature 95:16 112:24
exhibit 11:3,5,6,8,10, 13,18,24 12:12 14:25 15:1,8,12 16:3,11,12,14 17:8,9,11,20 18:17 20:19 22:22 23:6,18 38:16,18 39:1,9,10,11 40:25 42:3 44:21 45:3, 21 46:2,6,20,22 47:3,19 48:6,16,22 49:11,14 50:2,5,11,22 51:11,15, 18 53:8 55:3,11 64:17 67:18,20 73:3 79:13 84:11 86:13 91:8 92:5, 16 93:16 99:25 105:24	explained 87:20	fairly 43:11	features 107:18
	exposed 27:8 82:7 104:11,15,18 105:20,21 112:22 138:1	fall 15:19 20:5 58:10	February 7:1,10
	exposes 104:14	fallen 37:24 65:3 66:14 76:13 148:5	Fee 62:23 76:22 77:13, 16 144:24 148:16 149:13
	exposure 104:22	falling 135:20	feed 64:3
	extension 138:2	falls 123:12	feel 46:23
	extensive 56:20 100:14 139:3	familiar 33:17 34:4	feet 23:14,15,23 35:22 36:6 37:8,10 40:11,17 41:2,9,15,17 51:23,24 53:16,19,21,22 54:7,8, 19,24 55:1,13,22 57:12 58:9 69:5,7,8 80:3,5 81:8,10,11,24 82:9,15 106:4,5 117:17 120:20
		Fahrenheit 30:19 31:3, 7,8,10,11 111:19	fell 19:23 20:10 57:16, 19 79:15 82:19 103:20 145:15 149:6
			fence 148:1
			ferrous 76:9
			field 14:22 34:7,18,22 37:17 40:1,8 42:1 66:11,14,15 67:9 68:12 78:5 90:17,20 103:24 136:23 147:14,17,20,22 148:8,11,12,13,14,20, 22 153:14
			Figure 108:8

figured 153:17	flying 78:6,8,12	14,16,23 105:1,21	Gold 9:18,19
file 12:13,18,24 13:3,6, 8,10,15 24:9 33:16 44:3,22 53:3 71:15 108:14,20 109:4 111:4 132:24 139:17 140:17 144:9 145:22 146:1,13 147:1,3 154:14	focus 113:14	107:7,12,17 108:1,6,20 109:6,8,22 110:6,7,23 112:25 115:24 116:10, 12 117:11	Gonzalez 20:22,24
filed 7:13	focused 112:3	fractured 91:9,15 93:17 99:24 102:2,22	good 8:15,19 9:25 10:6, 15,16 33:25 34:7 61:12 65:14 84:9 90:2,3 123:19 140:24 145:11 153:20,24 155:10
files 13:2	folder 44:6,20,22 139:16	fractures 75:4,5 100:5 102:10 105:17 111:4	Gotcha 13:5 19:25 30:24 41:4 52:9 53:20 54:20,22 74:22 133:24 147:19
finally 107:10	folders 44:9	frankly 13:2 32:12	grabbing 78:23
financially 7:7	folks 139:21	free 46:23	grass 147:15,23 149:10
find 52:10 75:20,21,23 78:14 83:7,23,25 84:3,8 114:15 150:17 153:5 154:7	follow 52:9,11 58:6,21 75:15 100:7	freezing 72:10,11	grasses 31:13,22 148:14
findings 152:12,17,22	foot 53:11,12,19 69:8 81:12	fresh 25:6,24 26:4,6,21 27:5,11,18 28:7 103:5, 11,19	gravel 66:9,15 82:19 83:13 84:2 103:24 147:13 148:12
fine 52:10,24 53:5,6 72:7 78:24 82:16 84:5 140:25	force 83:12 128:1,19 132:18 133:14 143:1,6, 12,17	front 24:9 38:20,24 41:14 129:25 154:17	gray 27:1 105:13
finish 41:5,6 140:23	forces 112:23 113:1 122:13 130:22 131:12, 15	frozen 65:9 72:16	greater 65:6,22 66:2
fire 18:22,23 19:1,4,22 21:16 25:5 26:13 27:8 28:21,24 29:21 30:1,6, 11 32:7,10,18 33:2 37:22,25 38:8 41:14,25 42:4,12,15,20 49:25 59:13 60:1,9 63:10,19 68:20 73:10,20,23 74:3, 5,6,14,19 76:19,24 78:3 79:16,17,19,23 80:17, 23 81:1,2,6,23 82:8 88:21,23,25 89:2,4,10, 14,21,22 103:21 104:5, 7 122:2,17 128:11 147:21 148:2,17 149:4, 20,23 150:16	forget 55:20	fuel 29:13,15	green 27:2
fires 19:1,4,11,13,22 20:17 22:11,13	forgive 11:1 26:15 94:1 103:12	full 23:11 50:11 110:2	Greg 7:6 8:9 46:7,23
fix 90:13	formation 28:13	fully 71:11	grew 108:10
fixed 124:8	formed 28:12 94:5 103:7	G	gross 91:24
flags 148:17	forming 13:9	Gary 7:15 10:10 155:24	grossly 143:22
flat 96:23,25 97:3,14, 22,23 98:3,24,25	forms 135:23	gave 27:19 64:13 82:2 88:13	Grotefeld 9:9,12
flea 147:10	forward 11:7 154:21	gee 96:17	ground 20:11 24:4 27:8 31:15,17,25 32:3,18,20, 23 33:1,9 34:19 35:7,13 37:15,19,22,25 38:3 40:23 44:2 50:24 51:1 55:5,7,9,12,18,23,24 56:3,7 57:19 58:4,5,14, 16 59:24 60:11,13,16 61:3,8,20 64:23,24,25 65:2,4 66:3,4,7,21,25 67:3,5,10,13,14,16 75:18,21 76:3,13 79:15, 16,17,18,23 80:17 81:1, 24 82:19 103:21 122:2, 17 123:12 129:16,17,21 150:2
flow 85:19 86:24 87:1	found 25:20 75:25 78:5 154:8	general 14:22 15:13 16:6 29:24 103:2 104:17	grounded 58:3,15 80:7
	four-hour 149:14	generally 24:24 29:18 30:11 64:12,13 73:12 104:8,19 124:8 135:3	grow 149:5
	fourth 73:2	generate 86:21,22 138:2	grown 147:15,25
	Fowler 7:16,25 10:10, 15 15:12,17 43:25 48:19 65:11 72:9,12 73:2 90:13 124:3 139:20 141:8,9 155:11, 24	generated 91:9 97:5	
	Fox 9:19	give 10:24,25 20:2 27:23 43:8 46:4,24 53:9 70:25 71:12 73:22 77:9 89:20 113:10,16 125:18 129:19 132:6	
	fracture 19:9,11 75:9 91:14 92:1,11,16 93:22 94:12,21 95:15 96:7,23, 25 97:2,3,7,14,22,23 98:3,24,25 99:1,12,16 100:9,16 102:19,20 103:1,4,15 104:10,13,	glitch 131:23	
		globules 75:17 76:3,12	

growth 95:17	131:16 136:5	image 49:13 53:10 95:2 121:17	initial 140:11
guess 29:19,21 105:11 119:6	higher 92:8 111:20 131:12	imaging 143:11	initially 14:8 142:2
guy 58:3,10,15,17 80:7	hit 31:15,17 48:18 50:7, 19 63:2,3 76:3 81:11	immediately 138:9	initiation 32:24
guys 78:22 153:17	hits 58:7,10 59:1	impact 63:5 141:10	input 36:21 75:13 126:9
H		implies 129:7	inspected 62:9
half 53:18,19 69:8 82:14 155:6	Hoffman 9:10,13	important 152:16	inspection 44:7,23 62:14,17,22 144:13,15, 16,19,22,25 145:2 147:8 149:14 150:8,20, 22 151:7,10
handbook 95:14 108:22	hold 74:25 101:23 121:1 132:17	inches 23:14 36:6 40:12,18 41:17 51:24 53:12 54:21 55:21 106:5	inspections 39:20 150:6,19 151:18 152:9, 10
handling 49:24 121:11	holding 70:2	incident 15:15 74:13 126:19 132:14	installation 127:21 128:7,11
handwritten 133:6	hot 102:11 103:5,17 117:11 120:1	incidents 124:24	installed 41:20 42:9
handy 52:23	hour 43:15 155:6,7	incipient 75:8 91:13,24	instructions 14:13
happen 92:12 112:2	hourly 154:19,22	include 44:17 57:21 92:25 93:1 109:4	insulated 129:10,16
happened 96:23 138:23	hours 145:3,6 155:6,12	included 12:25 95:13 116:14 117:7	insulation 129:13
happy 52:24	housekeeping 139:15	includes 21:23	insulator 81:19 96:15 109:13 131:17 141:15, 21,22 142:5,20,24 143:1,4,11,24
hard 28:17	Howard 8:23	including 12:1,13 15:15 28:10	insulators 109:20
He'll 77:8	hundred 10:22 17:19	inconsistencies 60:7	intact 117:24
head 86:18	hundreds 17:17	inconsistent 63:24 64:2	integrate 96:16
heading 134:14	hypothesis 138:5	increase 70:10	intend 15:24 16:2
hear 52:24 65:12 72:4, 6,10,13 140:4,6	hypothetical 111:23 117:3	increased 138:18	intended 15:5 17:20 61:11
heard 126:13 131:23	I		interested 7:7 78:22
heat 91:9 100:15 111:25 112:4 119:8,11, 21 120:5,7 122:1,17 123:13 134:1,6 138:18	idea 41:19 77:16 143:6	increases 135:5 136:8, 12	interrupt 46:23 109:25
heated 110:9,13 139:10	identified 28:22 32:23 35:20 39:7 55:3 65:1 66:21 67:6,17 98:6 140:10 144:23	indicating 80:6	intimate 86:10
heating 106:2 111:5,7, 11,15,25 112:4,7 113:3, 5,6 134:14,20,24,25	identifies 36:6 67:8	indication 19:21	introduce 11:3,4,6 38:14 46:1 132:23
heavily 18:14	identify 35:12 89:8 101:11 105:11 148:20	indicative 83:8	investigation 67:10 148:2
held 117:20 120:21 132:16	identifying 56:5	indicator 148:17	invoice 154:20 155:11
helicopter 21:1	ignite 30:1 31:12,22 32:20 33:13 37:25	individual 9:7,20 10:1 86:9 133:15	involve 18:18
helping 8:10	ignited 29:16	infers 96:18	involved 18:21 19:24 20:5,6,9,11,20 63:9 151:21,25 152:1
high 31:12 63:18 69:21 75:9 91:13,25 94:20,24 99:1,12,16 100:4,5 102:10 105:17 111:24	igniting 37:22 38:8	information 13:12 25:20 60:18 74:12 77:11 92:13 115:8 144:9 153:7,10,11	involvement 13:18
	ignition 28:23 29:2,7, 22 32:2,10 89:3,7,8 149:23	informed 62:25 63:6	
	ignore 11:8		

issue 21:3 36:25 75:14	Krsto 7:24 62:23 144:23 154:20 155:8,11	length 135:22	103:16 104:11 139:5 144:25
Item 34:4,6,12,17,19,21 35:1,3,18 37:5,18,21 38:3 39:20,24 40:7,17 41:9 42:21,22 44:2 45:23 47:21 50:24 51:23 52:1,18 54:25 55:7,18 57:16,18,20,21, 23 58:7,11 59:1 68:11, 25 82:24,25 83:3,15,19 84:10 90:16,19 91:1 93:2,18 94:13 98:24 99:14 101:14 103:23 106:4,18 148:11,13	Kumar 23:25 28:10 54:16 73:4,8 85:2 124:22 125:5 153:13,19	letting 72:2	longer 27:16 33:10 78:23 104:21 105:20 137:10,16,20 138:10
	Kumar's 12:22 13:6 51:5,10,15 64:16 67:20 83:7 84:3,11 93:15 95:19 106:17 117:15 153:22 154:5	Lib 131:9,11	looked 22:12,14 66:3,8 69:16 75:21 121:12 125:21 140:16 150:11
	L	Liberty 7:25 13:22 14:16 62:18 77:24	Los 7:14 13:17
		light 118:12 142:11	Loscotoff 8:5,16 10:2, 3
J		Lilla 9:9	lost 103:12 137:12
	lab 23:15 35:16,24 36:6, 7,9 40:17,21,24 41:8 95:19 152:11,12 153:22,23 154:1,5	limited 77:21	lot 55:8 57:16 71:7,8 83:13,22 84:2 88:18 97:17,19 101:11,17 103:24 121:9 132:2 147:13
James 18:20 19:1,3,13 20:18	labeled 57:15 147:3	linear 137:7,10,14	low 67:17 76:7 86:17 109:12 111:19 135:18 143:2
January 151:11	laboratory 142:17	lines 20:4 30:12 91:18 120:21 128:6,12,22,25 129:4,10 141:10	lower 31:10
Jason 9:1	Labs 150:24 151:15 152:8 153:23 154:5	list 10:22 16:5 17:6,23 18:17 20:19 21:9 22:6, 23 46:17 79:14 91:7	lunch 89:24 90:1,9 155:3
JCCP 7:14	lack 19:17	literature 30:18 108:14,20	lunger 139:12
Jerry 13:13,16 14:19,21 152:7 153:12	Lake 62:18 145:4	live 67:15	lying 55:18 56:7 68:12
Jessica 9:4	Land 151:7,11 152:8	load 107:4	M
job 61:12	landed 66:18,20 148:7, 12,13,22	local 105:25 107:5	
joint 151:22	Landis 9:14,15	locate 148:6,9	Madame 155:17
Jon 9:6	landmarks 145:14	located 35:18 40:24 53:10 55:1 56:5 59:11 62:16 69:12	made 19:5 37:8 47:17 53:2 140:11
Julius 8:25 9:1	large 65:5 99:21 138:1	location 23:21 25:7 35:25 37:3 49:10 50:4 52:1,2,3,5,6 53:7,21,22 54:9,12,14,24 57:12 67:11 70:24 71:20 73:13 81:13,25 82:3 83:21 85:13 86:17 88:14 93:1 94:14,19 97:6 98:22,23 101:5 104:6 117:18 118:4 120:22 138:15 141:16, 20 142:5,23 143:5,8 148:7,9,10	magnification 95:6 99:22
June 35:24 36:9 151:15,21 152:18	lasted 145:3		magnifications 101:21
	lateral 107:5		magnified 95:4
K	Law 9:19		main 114:5
	lay 26:17		majority 131:11 138:20
Kahn 8:8	layer 28:12	locations 39:5 69:2,25 91:19 101:10 124:23 125:22 126:16 145:13	make 16:19 17:1 23:12 50:1 59:2,7 77:10 90:15 92:13,14 106:21 109:25 120:24 130:25 133:25 149:18 153:7
kind 80:14 93:21 110:2 120:12 138:11 142:1 149:1	laying 55:12,23,24 153:10	lockout 24:4	makes 60:12
kink 83:4,6,8,21	layman's 132:7	Loewe 9:15	
Kirshner 9:3,4	layperson 94:1	long 20:7 53:4 56:4	
knew 140:17 150:4	leading 107:11		
knowing 115:11	leave 71:11 108:10		
Krell 8:10	led 100:5		
	left 39:15 41:8 121:17		

making 58:8,10 89:18 128:3	meaning 41:17 70:24 73:9 138:8	metallurgic 153:20,24	missed 10:5 135:23 136:15
Management 151:7,11 152:9	means 26:21 48:3 97:1 132:8 137:25	metallurgical 13:17 19:5 22:4 33:7 73:17 75:16 127:19 129:9 139:17 140:12,14 141:10 151:15,22 152:24	missing 89:19
Margaret 9:12	measure 37:12 82:11 145:13	metallurgically 70:23 73:22 74:20 120:5 124:16 127:22 128:10, 16	Modern 8:21
mark 16:11 17:7 26:20 27:24,25 28:6,22 35:10, 21 38:16,25 44:21 45:20,25 50:3 51:11 58:8 64:16 84:14,23 85:23 86:15,16 87:11, 18 108:19 139:15 145:21	measurement 82:12, 13 129:24	metallurgist 14:21 29:25 145:10 152:7	modest 70:10 83:4
marked 11:10 15:1,8, 11 16:14 17:11 38:18 40:7,11 42:2,9 44:6,14, 22 45:3 46:6,17 48:13, 16 51:10,18 109:1 132:24 133:1 139:25 140:3,8 145:21 146:1,5, 14	mechanical 45:12 49:20,23 57:17 82:20 83:3,8,10 84:7 121:15 122:9,13 130:16 135:19	metallurgists 28:10	modifications 17:1
market 147:10	mechanism 92:7 143:21	metallurgy 15:13	modules 131:12
marking 46:3 50:4	mechanisms 107:18	metals 95:13 110:8,24 116:17,24 128:17	moduleless 131:22
marks 27:12 58:11 65:2,4 80:4 95:16,18 97:9 98:3 106:9,11,13 108:11 126:22	melt 70:13 106:14 120:13	Meyers 8:11,12	molten 28:25 30:20 45:18,22 56:12,13 64:18 65:7 69:15 75:17 76:2,12
match 19:17 59:22	melted 57:11,12,13,15 88:7 91:8,12 98:14,16 101:2 106:5,6 112:12 114:12,15,23 117:9 118:10,17 139:9	mic 136:9	moment 67:1 71:12 86:18 129:19 148:19
matches 23:21 25:16 27:3	melting 25:6,25 30:22 31:1 56:20 65:4 69:21, 24 75:8,9,20 80:22 81:1 84:24 91:11,13,17,18, 22,24,25 92:6,16,21,23 93:6,10,23 94:6,19,22, 23 97:13 99:2,25 100:3, 4,9,11,14,15,24 105:25 106:3 113:23 116:15 117:8,10,14 118:15,19 121:13 133:19 137:24 138:15,18 139:3,22	microscope 27:7 86:19 105:16	MONDAY 7:1
material 56:10 64:18 69:15 99:10,25 100:11 101:3,16 133:10	melts 31:4 95:25	microscopic 95:7 99:20	months 27:25
materials 13:7 22:5 109:4	memoranda 12:14	microstructure 105:24 106:1 111:9 112:1 134:18	morning 8:15,19 9:25 10:15,16 16:5,9,23,24 17:2,6 23:3 38:15
math 133:25	mention 95:19 102:20	mid 42:6 91:10 92:7,15 124:7,10 130:2,5,10,13 131:17,19 142:23	motel 147:10
math's 155:5	mentioned 64:10	middle 15:10 35:21 37:7,9 40:6 45:24 53:15 70:25 134:3	Mountain 7:12 33:21 63:10 76:19,24 88:22 89:1,4,10 90:21 145:7 147:21 149:20,23
mating 19:18 56:21	metal 29:1 30:19,20,21, 23 45:19,22 75:18 76:10,14 78:13 95:25 102:11 103:5,11,19 104:14 106:14 107:2,8 108:10 113:1 118:13 143:22 150:11	Mijanovic 7:23,24 155:9,21,22	move 56:7 82:18 91:7 140:21,23
matter 29:24 104:8 109:18	metallography 93:6 138:16	mind 115:20 121:11 122:10	moved 48:24
maximum 124:6		minimum 134:2	movement 122:20,22 123:5 124:5,6 129:8 141:14 142:11 143:3
Maxwell 9:16		minor 122:4	moving 58:14 142:1 143:7
Maycon 8:22,23		minus 155:5,6	multiple 16:17 23:18, 20 26:10 57:11 75:4,6 80:4 91:8,12 97:3 101:7 117:18 126:4,14 135:12
Mccullough 8:9 46:7, 8,11 47:1,7,11 48:5,9, 11,15		minute 36:4 50:17 84:4 100:2 121:1 136:13 141:14 143:3	multiplied 133:13
		minutes 41:6 123:20 140:22 144:10 155:3,5	multiplying 154:19
		mislabeled 84:7	mute 65:11
			mutual 113:23 116:13
			N
			narratives 113:11

STENO.COM
(310) 573-8380

paint 47:15	periods 105:21	physically 128:25 129:2	19,22 39:3,15 40:2,9,14 41:15,18 57:18,22,24 58:1,9 59:17 61:24 62:4,5 63:1,2,3,18 80:2, 6 81:8,13,17,18,20,25 82:1,4,10 91:1 93:2 145:17
panel 78:5,14 89:12 150:18	permanent 143:23	pick 87:1	poles 23:8 33:24 36:3 92:8 96:14 145:12 147:12
Pao 29:12	person 151:4	picked 76:10,13	polished 115:15
paper 142:1 143:15,21	personally 33:6 35:15 151:2,14,20,23 152:2	picture 86:1	polishing 114:17 115:5,12
parallel 85:16 86:11,23 87:20 135:16	perspective 145:11	pictures 145:23	poor 64:25
parking 55:8 57:16 82:20 83:13 103:24 121:9 147:13	phase 23:18 24:2,4 25:9,14 29:14 30:13,15 32:1,17 34:7,18 39:17, 19,22 41:24 42:3,16,17 56:18,25 57:8,9,25 58:7,20,25 59:8,23,24 60:10,13,15,16 61:2,3, 7,8,14,16,17,20,25 63:15 64:5,6,19,22 66:25 68:23 70:18,19 73:11,13,19 74:9 77:7 81:16,22 82:6 85:2,25 87:12 88:19,23 89:5 90:17,20,21 92:22,23 106:18 124:14 125:15 126:1,19 127:13 130:3 135:14 136:17,19,22,23 137:3,4,15 139:1,22 147:18 148:21	picturing 141:25	popped 11:22
parking 55:8 57:16 82:20 83:13 103:24 121:9 147:13		piece 37:7 78:13 86:6 103:20 106:14 107:2,9 127:7 137:25 143:22 150:11	porcelain 141:15
part 13:3 25:2 51:5 53:3 57:1 93:10 101:2 112:4 149:9		pieces 66:15 90:19	porous 66:9
participated 151:23		Pitch-man 82:22	portion 34:21 39:22,25 56:1 57:15,20,23 58:13 59:1 65:20 82:5 96:1 117:8,9
particles 75:25 76:5,8 116:13		pivoting 123:19	portions 12:4 81:5
parties 7:9		place 96:3 115:10 138:10 144:16 147:11, 12 151:23	Portland 18:21
parting 85:12,18,25 86:4,14 87:4,5,17 88:9, 16 105:4,8 116:19,22 118:23 119:8,12,13,16, 17,21 120:6,8,10,16		plaintiff 8:20 18:11,13 21:16,18 22:17	position 59:14
parts 36:19	phases 33:24 135:15	plaintiff's 21:15	possibility 73:24 74:10
passage 26:25 27:2	Phd 7:16 155:24	plaintiffs 7:21 8:6,9,13, 17,24 9:2,4,7,10,13,17, 20,23 10:1,4 16:8 17:5 18:6 155:20	possibly 22:13 109:17 145:4
passed 148:8	phonetic 82:22	plaintiffs' 15:19	posts 148:1
past 18:12	photo 24:10 44:21,24 45:2,5,7,22 46:1,20 48:1 49:1 55:4 57:5 67:25 71:14,19,22 98:22 148:25	plan 84:9	potential 75:19 89:3,8
path 85:16 86:11,23 87:21 119:2 135:17	photograph 44:3,5 45:15 48:22 81:19 83:6 84:1,6 99:7,11,20 117:23 147:14	plane 21:1	potentially 35:12 37:14 40:23 44:1 50:25 51:2 67:15 78:11 126:24 127:12 149:19
Paul 9:15	photographs 13:2,13, 19 14:2,6 33:8 35:15 36:1 37:12 44:12,15,17, 18 49:15,16 55:17 65:1 66:17 67:7 82:13 83:24 99:19 145:21 146:2,14, 20,22 147:4 148:2,6,22 149:2,8,10,12 151:3,17 154:14	platform 11:2	pounds 131:9,10 132:18,19 134:4,8,12
pause 132:1		playing 11:1	power 141:10 149:22 150:1
pay 112:14 149:17		plenty 75:24 100:4 133:23	Powerpoint 51:4,7,10, 15 64:16 67:21 84:11 93:15 106:17 117:16
PDF 15:11		point 24:21,25 25:1,8 35:17 40:18 42:14 49:17 53:23 57:21 58:13 69:12 73:2 81:24 91:12 92:20 93:18 99:2 102:1 105:25 106:3 112:5 117:11 118:6 123:19 124:21 125:5 142:3 144:12 150:4	preceded 60:17
peak 114:23 115:16		pointed 60:6	
pencil 47:8 106:23,24	photos 44:23 139:17	points 16:16,17 23:11	
people 30:3 32:13,23 33:3 34:11 37:24 82:21	physical 15:16 25:11, 23	pole 23:8,14 33:17,20, 21,23,25 34:2,3,10,16,	
percent 133:21			
percentage 18:10 21:13			
Perfect 48:14 50:19			
period 40:19 43:12 104:11 112:15 142:10			

precise 20:8 27:14
77:9 82:12

precisely 28:2 58:17

predated 41:14 42:15

prefix 11:9

prepare 114:18

presence 42:6 43:7

present 15:2 19:17
28:15 36:9,11 38:22
46:9 47:2 62:22 98:5
106:9 116:4 144:21

presented 22:22

presenting 11:12,21
48:4,18 50:20 139:18

preserved 150:24

pressure 29:1

pretty 16:4 77:5

prevent 127:11 129:20

prevented 127:2

previously 53:14
73:25 106:15 125:17
130:6,7

primary 154:12

principals 15:13

prior 13:18 17:6 21:4
24:4 36:20 67:18 74:9
88:14 90:17 101:4
130:13,20 131:18
152:6,23 153:14 154:1

problem 34:10 126:3
134:16

proceed 17:5

process 70:20 94:6,25
100:3 105:22 138:10

produce 12:17 83:14

produced 12:21,24
13:3,10,14 38:15 53:3
154:5

producing 13:7

production 12:1,12,25

professor 29:9

progressive 108:9

prohibited 153:4

pronounced 131:22

properly 23:12 39:10
50:1 127:16,21 145:24

properties 133:10

Property 8:21

protection 103:9

provide 16:21 73:16

provided 16:4 24:18
25:20 27:21 60:16 64:7
108:4 133:19 140:15
153:9

providing 59:25

proximity 87:14

PSI 131:7,13,14 132:5

public 7:6 9:2

pull 24:10 107:3,8
115:21 143:10 149:11

pure 31:3

purpose 41:12 91:21
127:9

purposes 35:25

put 14:25 26:9,22 28:18
36:5,7 40:5 50:11 67:10
81:22 86:6 127:8
138:12 139:13

Q

quarters 47:8

question 20:1 32:14
55:10 56:8 59:15 65:14
68:15 70:17,21 72:3
77:21 88:3 89:17 96:10
98:17 99:15 110:12
113:14 114:19 125:24
126:25 134:19 135:4
140:6 150:4 153:19
154:4,8

questions 23:5 41:6
57:4 77:20 112:16
124:15 140:19 149:25
154:11

quick 90:13 113:14
125:18 139:13,15

quicker 47:16 140:21

quickly 113:11,12

R

R-E-F 40:20

range 27:23 31:5,10
54:5

rapid 70:12

rapidly 70:11 97:14
102:13

rate 136:7,11 154:22

rated 131:8

reach 36:21 128:25
129:4

reaching 129:1

react 102:11

reactive 43:11

read 23:2,4,11 24:5
58:22 65:17,19,21
111:1 130:24 131:20
132:2 135:9

real 90:13 125:18

realistic 96:10 111:22

reality 99:1

realize 33:8 52:3
128:19 142:24

realizing 81:19

reason 64:1 67:4 88:13
137:2 154:4,7,8

reasons 67:12 145:19

recall 18:12,21,22
22:16,21 24:18 45:13
59:16,19,20,21 60:21,
24 64:11 75:21 76:25
77:15 78:1 83:21
117:22 123:10 148:18

receive 14:2

received 12:22,24
13:1,7 16:8 17:5 36:23
144:8

recent 18:13 22:17

recently 13:1 21:18

recess 43:21 72:22
79:9 90:9 123:24 141:4

recloser 24:1 25:19
57:1 59:22 60:8,9 61:5,
7 63:24 64:2 70:19
75:11,13 77:3,4 124:19
150:5

recognize 51:14
106:19 146:8,11

recollection 20:8 59:5

record 7:5 17:4 23:4
24:6 43:20,23 65:10,21
72:5,15,17,21,24 74:2
78:21 79:4,5,8,11 90:5,
7,11 91:6 123:23 124:1
135:9 141:3,6 154:19
155:2,25

recorded 7:15 59:23
70:21

recordings 59:24

recovery 49:25

recrystallization
106:2

recrystallizes 112:1

reduce 70:13 109:16
129:22

reduced 107:11 117:13

reduces 135:6

Ref.0. 36:7

refer 11:7 25:6 27:4
34:2 44:3 51:12

reference 23:15 24:10
35:22 36:1,3,7 37:3,7
40:18,19 41:2 51:24
55:22 64:9 69:4

referenced 22:18 61:7
85:2

references 71:15

referencing 46:20
108:24 124:22

referred 26:4 27:18
35:11 37:13 39:19
41:22 53:14 54:23 73:8
90:16,20 107:6 112:8
124:17 144:4

referring 34:6 35:9 44:25 45:11 54:17 69:15	63:4 96:19 128:16 130:6,7,8	reviewed 12:21 51:7 60:23	146:1,14 147:3,6,7 148:5,21
reflect 43:2 49:20	replacement 131:19	right-hand 48:6	Schmitt 8:18,19
reflected 16:3	replacing 14:18	Ring 60:22 64:9	Schreiber 9:6
reflection 15:23	report 24:19 67:8	roadside 42:24,25 43:1 136:19,21 137:4	Schroeder 8:4,14,15, 16
refurbished 63:1,6	reporter 10:7,8 65:9, 17,24 72:9,16 78:25 90:5 154:24 155:18,19, 21	Robertson 9:24,25	scope 62:2 127:3,17
regard 106:11 109:22	reports 12:14	rock 66:4,6,10 67:9	Scordalakis 139:20
region 42:6 106:9	represent 17:21	rocks 65:2 67:14	screen 11:14,18 39:8, 11 45:6,17 46:16 47:4 48:19,21 51:3,21 67:22 84:10 145:23 146:3
register 75:12	representing 14:16	role 7:18	scroll 11:24 15:4 67:19 146:7
related 15:14 91:18 97:2 150:15	represents 103:4	Romney 8:1,2	scrolling 146:12,16
relates 36:1 102:7	reputation 153:20,24	roof 78:5,14 89:12	SEAL 153:23
relating 18:23 19:2,13 20:17	request 12:12 53:25	room 107:3,8 112:7,20	search 52:25
relation 53:7 55:1	requests 12:1	roughs 155:19	section 15:4 42:18 66:13 95:14 96:12 109:16 128:16
relationship 54:25 145:16	residual 133:23	rounded 101:1	segment 96:18
relative 7:8 82:12 142:11 143:3,4	resistance 106:2 111:7,24 113:6	rows 106:8	selected 97:25
release 122:1,16,21,23 123:1	resistive 111:5,11,15 112:4 113:3,4 134:14, 19,24,25	ruled 150:14,15	Sell 9:11,12
relevant 45:22	resolidified 106:6 118:13	run 83:14 86:6	send 154:20 155:11
relied 12:20 13:9,12	resolved 36:25	Russ 9:19	sense 43:11 71:9 92:14
relying 60:3	respected 153:1	Russell 24:2 25:9,18 61:15,19 62:23 70:18 73:14,24 75:10 76:22 77:1 87:14 124:18 126:9,25 129:14 135:2 144:24 149:13	sentence 24:20,23 28:14 65:25 80:16 122:3
remain 76:5,8	respond 59:15	Russell's 77:12	separate 88:16 90:19 107:10 119:14 120:3,4
remained 103:16	response 24:25	S	separated 23:19 39:6 52:4 54:19 55:15 69:6 73:3,8,18 74:3 81:7 83:18 86:8 87:16 91:11, 22 92:3,21,22 95:17 96:18 114:20 122:6 125:8
remaining 70:1 104:17 118:4 135:17	rest 21:20	Sacramento 21:17	separating 117:2
remains 43:12	restrung 81:21 145:18	saddle 141:22	separation 23:13,15, 22,24 33:12 40:11,17, 25 41:3,16 52:2,19 55:5,19 57:21 84:14,15, 22 86:10,24 87:4,5,19 88:9,16 91:12 105:25 106:3 107:11 114:1,4,6
remember 20:8 21:16 51:9 61:5 69:1 124:15	result 130:6	sag 142:25	
remotely 7:11	results 115:13	sagging 143:11	
removed 62:19 63:2	retained 13:21 14:7 21:7,12,14,17,18,21 22:1,3,4,9 152:4	sake 155:5	
render 19:8,12	retains 26:9	samples 40:21 114:18 153:8	
Reno 145:2	retention 14:14 21:6 144:2	sandwich 79:2	
repair 130:2	retentions 22:19	save 48:6,10 50:7,19	
repaired 62:11	review 51:4 64:11 140:14	scanned 53:2 147:3 149:9,10	
repeat 85:4		scene 33:10 145:10,21	
replaced 20:12 42:19			

118:6 123:12 135:11, 13:15,19,20 138:15 139:4	showed 55:12 99:21 101:8,11 130:2 133:12	22:22 23:5,12 24:5 28:16 38:17 39:11 40:4 41:6,10 43:15 45:7,17 46:3,16 47:2,16,17 49:19 50:5,14 58:22 64:14 65:25 67:22 68:3 76:18 79:2,16 80:9 81:3 82:16,18,24 87:23 88:20 89:25 91:6,17 97:17 98:17,24 108:23 112:13 117:22 123:20 130:1,24 131:21 133:3, 6,8 135:8 136:1,13,16 139:15 141:1 145:25 154:10,11	106:16 107:25 112:8,10 114:9 117:15 118:7 119:9,22 121:18 122:4 138:17
separations 74:17	showing 11:17 40:7 45:7 74:2 81:19 99:19 100:6 101:13 147:14		slides 12:23 52:13 69:16,25 83:7,22 84:3 114:22 115:20 116:25
September 151:7	shown 123:17 138:16 146:10		slightly 16:9
sequence 57:7 80:9 117:4 138:8,12	shows 25:11 35:19 39:3 45:12 52:7,22 53:4,15 54:25 71:16,22 84:1,6 93:6,10 100:23 110:22 114:11,22 115:15 116:2,4 122:13 133:20 141:13		slowly 11:25 146:8
series 22:11	shut 150:5	sit 60:21	SM 44:10,15
service 58:8 59:2,9 61:25 63:14,15 64:4,6 90:25 91:3 145:17	sic 44:22 106:23	site 32:24 62:14 144:12, 15,19,21,25 145:6 147:8 150:7,19,21	small 35:10,12,21 45:24 48:25 65:4 67:18 114:23 115:15 153:17
served 62:12	side 21:15 31:14 34:18 39:15 40:1 41:16 46:17 48:4 49:1 50:3 71:22 78:5 81:20 88:1 90:17, 20 93:2,18 103:6 106:5 118:9,17,18,20 120:13, 16 136:23 142:9,10,12 148:12,13	sits 141:22	smaller 107:4
set 146:8	side-view 52:15	situation 107:13	softball 55:10
sets 83:24	sides 23:19 86:10 96:17 114:5 142:25 143:12	size 65:7 67:1 133:9	sort 49:17 124:17
severe 23:20 105:18 141:13	significance 43:4	skipped 143:25	sound 33:25 34:7 90:2 140:24
severed 55:15 69:22 75:6 138:14	significant 56:22 57:10 63:10 111:8	slan 125:11	sounds 84:9 90:3 125:16 155:10
severing 69:24	similar 14:23 59:12 94:12 119:21	slap 19:14,21 29:25 30:5,12 31:21 69:9,11, 14,17 70:15 71:16,18, 20 73:10,19 74:2,4,13, 24 75:4,17 79:18 85:3,7 86:3 88:10,11 95:3 105:8 124:13,24 125:1, 9,10,14,20,22,23 126:4, 12,17,18,21,22 127:2, 11,14,22,24 128:20 129:5,10 130:6,13 132:13 136:16,18 137:3 138:6,9 139:6	source 28:23 29:2,7, 13,15,22 32:2,11 89:3,7 149:23
severity 129:13	Simon 8:7,8 47:23 50:11 77:19 78:22	slapped 91:19 128:5,6, 12	sources 89:9
shaped 50:3	simple 26:23	slapping 74:18 95:5	South 62:18 145:4
share 39:8 46:13 47:3 48:21 51:3 76:23 77:1, 13,24 78:2 84:9 145:22	simplify 26:18	slaps 70:21 71:2 75:2 125:25 126:6	Southern 21:23 22:2,8
shared 45:6	simply 17:21 56:6 64:4 98:17 112:3 134:10	slide 51:12,14 52:7,10, 22,23 53:10 54:12 56:11 64:16,18 66:13 67:20 68:6,9,17,25 71:18,25 84:7,11,13,18, 19 85:24 86:13 87:16, 22 93:11,15 94:3,12 95:2 97:22 99:5,8 101:4	spaced 127:16,21
sharing 11:16 77:10	simultaneously 97:11 98:8		spacer 127:4,6,9
sheet 140:19 150:11	single 17:7 54:17,24 69:4 126:21		spacers 127:1
shinier 27:6 105:15	Singleton 9:6		span 23:23 38:16 39:2 42:6 70:25 91:10 92:7, 15 95:7 124:7,10 129:23 130:2,5,10,13 131:2,10,17,19 142:23 145:13
shiny 49:18	sir 11:12 14:7 15:6,21 16:12,19 17:5,9,15		spanning 20:14
Shkolnikov 9:8,9			spark 29:15,21 120:11
shop 46:13			sparking 63:9
short 43:12 72:18			sparks 28:23 59:2,9,11, 13,17 61:23 62:5 63:16, 17
Shorthand 34:2			speak 152:16
shortly 61:21			speaking 16:7 97:11
show 24:14 37:11 41:1 45:10 51:3 66:18 67:7, 21 94:10 96:21 97:1,4,6 98:21 99:20 100:11,18 103:2,6 106:16 114:20 115:4,13,19 117:15 122:12 126:17 138:18 148:1 149:10			

98:8 128:10	stay 34:15 70:13 103:23	11 113:24 115:18,25 117:9,19,21,24,25 118:5,17,18 120:21 121:3,22,23,24 122:5 126:23 131:15 132:15 135:17 138:17,22 139:9 142:13,15	sudden 121:25 122:16
special 93:5	stays 30:20	strength 57:14 70:13 86:20 96:9 112:23 113:1 117:12,13 130:21 131:1,5,6,8 132:3,10,21 133:14,20,22,23 134:2, 8,10,22 135:5 138:20	suffices 52:14
specialist 25:19	steel 31:1,2,7 93:4,6 105:24 106:4,12,17 107:7,15,20,22 108:2 109:21,23 110:5,7,8,9, 10,13,14,20,23 111:4,7, 10,11,15,16,21,25 112:5,6,18 113:2,4 114:4,11,20,24 115:1, 14,19 116:5,10,15,20, 23 117:4,8,9,12,19 118:1,3,7,9,19,21 120:19 121:25 131:1,6, 11,12 132:3,9,11,13,16, 17 133:13,16,20 134:1, 2,7,10,13,20,25 135:5	stress 131:3,7	sufficient 33:13 131:1 138:24
specific 15:14 22:7 41:21 42:5 71:18 126:13 138:12	Steno 7:7 10:8	stresses 92:8 97:5 131:16 132:9 138:1	suggest 30:21 42:7,14 45:1 126:24 130:5
specifically 27:23 41:1 61:1 82:11 110:22 150:3	step 57:6 98:15 107:21	stressors 109:11	suggesting 127:25 128:1
specifications 133:11	Stephanie 9:22	stretch 107:9	suggestion 128:3
specificity 43:9	Steven 62:23 139:19 144:24	stretched 129:3	suggests 130:7
speculate 76:15	Stevens 8:3,4,5,16	striated 97:6	Superior 7:13
spend 56:4	Sticking 28:14 42:1	striation 98:11	support 12:21 28:6 78:18 131:2 138:5 139:9
splice 41:9,13,16,23 42:9 43:3,7 96:20	stop 48:4,18 50:19 89:25	striations 95:10,11,15, 18,22 96:2,5 97:8 98:3, 13,18 106:8,10,13 108:11 138:4	supporting 33:2 70:8
splices 39:6 41:19,23 42:2,6,8,19 96:17 130:2 131:18	storage 26:9	strike 14:24 56:9 69:10 88:21 90:18 104:2 137:1 152:15	supports 25:24
spoken 36:15 77:5	strand 54:18 57:12,13 69:6 70:8,14,16 84:14, 15 86:9,13,25 87:15,16 88:6 91:11,22 92:10,21, 22 93:10,22 94:24 96:11 98:23 99:9,14 100:19 101:22 103:3 104:17 105:13,19,20 113:25 117:5 118:24 121:24 124:22,25 125:8,11,20 131:3 132:14 133:13,15 134:7,11 135:16 138:20,24 139:2 141:20	struck 132:13	supposed 17:23
spot 155:4	strands 23:24 49:18 52:4,5,15 54:18 69:5, 23,24 70:1,9 73:4,8,18 74:4 75:6 85:2,17,20 86:1,7,9 87:6 88:1,2,7, 15 91:13 93:1,17 94:11, 13 99:24 100:8,10,11, 16 101:7,14,15 109:8,	structure 114:12	surface 93:22 96:1,7 97:7 98:4 100:10 102:19,20,22 103:1,2,4, 15 104:12,17,21,23 105:1,21 115:15,18,24 116:10,12 137:7,8,14
squiggle 41:14		studied 30:7 38:13 89:6	surfaces 91:16 99:25 102:3
stable 43:13		studies 28:5	surviving 118:18 121:2
stamp 73:22		stuff 71:4	suspect 34:4
stand 91:11		subject 15:14,15 35:1, 6	suspended 123:9
standing 149:1		subrogating 8:17,20 9:13,16,23 10:3	swear 10:8
standpoint 73:17 75:16 127:19 129:9 139:5 141:10		subrogation 7:21 8:5, 13,24 9:10	sworn 10:11
stands 35:20		subsequent 35:25	synopsis 20:3
start 16:9 17:15 22:24 23:3 40:21 44:15 56:18 60:1 65:15 80:16 88:4 89:25 137:23		substantial 26:25 107:4	
started 21:17 76:19,24 112:10 120:19 144:2 149:5			T
starting 7:18 89:24			table 14:5
starts 139:19			taffy 107:9
State 7:13			Tahoe 62:18 145:5
states 15:12			takes 27:16
static 131:4			taking 7:16,19 72:7 78:22 96:3 98:15 138:10
			talk 24:22 34:25 39:8 73:24 87:14 113:20

126:10	97:24 113:21 114:2 121:21	ticks 47:24 49:1,12 50:4,21,22 53:7,9 67:18	transcripts 13:8
talked 25:24 26:3 40:22 50:23 67:1 69:1,25 71:4 80:8,10 84:25 102:6 124:12 128:15 135:21 136:16 150:7	termed 99:5	tie 57:2 78:15 141:21	transfer 116:9,11,16,24
talking 21:4 30:10,11 31:20 35:1,5,7 39:25 43:25 59:19,20,21 71:17,22 82:24 87:9 90:25 105:3 108:16 110:11 113:2 119:5 120:19 129:6 142:8,18	terminology 33:15 90:14 106:22	time 7:10 16:10,24 21:13 26:7,25 27:2 28:15 33:9 36:22 42:4 43:12,19,22 52:14,25 60:1,3,17,19,25 61:2,7, 9,15,16 62:11,12 63:24 64:13 68:21 72:20,23 73:20,22 74:11 77:8,9 79:7,10 90:6,10 98:15 101:23 104:11 109:18 111:1 112:16 123:22,25 125:7 127:21 138:12 139:11,14 140:16 141:2,5,11 142:2,3,10 143:18 144:16 145:1 149:21 151:2 154:18,25 155:14,24	transformer 59:18,19 62:8,9,13,16,25 63:2,4, 8,12,13 144:16 150:9
talks 112:10 122:3 124:22	terms 21:6 26:23 27:11 33:17 34:5 132:6 150:6	times 10:17,20 17:18 21:7,11,12 22:1,6 26:16 120:3 123:11 131:4,13 133:13 155:6,12	translation 132:7
tape 37:12	test 12:7 115:13	timing 25:16 59:21 60:15 63:23 73:16 77:6 139:5	transmission 132:1
technically 94:4	testified 10:11 17:17 18:1 22:23 59:3,12 63:7	tip 46:14 88:6	transmitted 140:10
technician 44:11 153:9	testify 15:13,18	tips 88:1	tree 19:23 20:5,11 135:20
technology 48:21	testifying 18:5,9 59:16 60:24	titled 95:14 108:20 139:17	trees 19:24 20:6,9 130:17
telling 25:15 37:2 124:23	testimony 15:5,14 17:6,14,21 19:20 20:19 21:5 41:24 59:15 60:6, 7,20,23 61:4 64:7,8,11 95:20	today 7:10,23 10:7 11:7 46:3 60:21 80:10 102:6 135:22 136:17 144:1 154:15	trial 17:6,14 18:2,10,20 21:5
tells 65:8	testing 151:15,22 152:8,18	today's 154:25	triplex 15:16 57:24 58:1 80:2,4 90:24 91:3 145:16
temperature 30:14,17, 20,22 31:4,11,17 75:9 76:8 91:14,23,25 94:21 97:12,13 99:1,2,12,16 100:5 102:1,9,11,12 103:11 105:17 107:3,8 111:18,19 112:7,20 133:18,19,21,22 134:22,25 135:1,4 136:7,12	Texas 22:15	told 86:5 150:14	true 91:23
temperatures 30:16 31:2,9,12,24 69:22 94:24 103:10 105:22 111:20 112:19 136:5,6	theoretical 117:2	Tom 62:23 77:13,16 144:24 148:16 149:13	Tuffley 8:20
ten 22:13 51:23 123:20 140:22	theoretically 109:17 134:17	toolbar 47:8	turbulence 141:14
ten-minute 43:15 72:19	theory 105:6,7	top 39:16 46:19 48:6 59:17 61:24 62:5 63:18 101:1 139:20,23 141:22 146:25	turbulent 128:2,20,21, 24 129:7
tensile 106:4,25 107:1, 14,15 111:12,16 112:22 131:12 133:14,22	thing 13:11 101:23 110:4	topics 18:16	turn 27:1,2
tension 70:4,10 122:1, 16 131:4,9,15 132:19 143:1,10,17	things 26:18 80:15 86:20 97:19 113:13 140:21	tops 49:18	two-thirds 18:13
term 34:4 90:24 93:24 94:1,4,8,9,17 96:23	thinking 96:17	traces 114:8,14	type 18:19 48:9 50:14, 18 86:15 119:9,16
	thought 30:18 73:21 79:6 82:17 91:20 101:18 129:18		typically 23:22 27:4 29:8 30:21 32:14,15
	thoughts 140:21		typing 50:15
	three-page 16:10		typos 17:3
	three-strand 52:6,19		
	threw 134:9		U
	thumbnail 106:7,9		
	tick 33:11 35:11,14,18 37:1,5,13 40:22 44:1,4, 24 45:10,25 47:18,20 49:10 50:25 53:15,22 54:3,8 55:3,15 120:11		Uh-huh 19:19 20:18 26:15 27:22 35:14 43:4 46:1 53:13 63:21 71:3 75:7 101:9 106:16 108:7 114:10,25 118:8, 14 125:6 126:7 138:25 144:6 146:16 147:16 148:3
			ultimate 112:23 133:21
			ultimately 70:16

unable 115:9,11	versus 18:20 129:7 136:5	weakened 92:10	working 22:24 48:20
undergoing 111:5	vertically 38:23	wear 92:9 109:14,18 141:16 142:3,4,11,12, 14,18,22 143:5	works 155:9
underlying 140:9	Victor 58:23 59:3,12 60:19,24 63:17	wears 143:18	world 29:10
underneath 29:14	Victor's 60:4 61:22	weeds 147:25	worn 142:9
understand 10:18 22:25 37:2 64:8 66:23 85:5 96:22 97:24,25 100:17 105:3 111:2 119:17,20 121:20 128:4,6 142:7 145:15	Victoria 58:22 59:3,12, 16 60:3,19,24 61:22 63:17	weeks 14:10 144:7	worry 38:24
understanding 13:23 30:5 31:16 36:12 61:18	video 7:11,15 60:22 64:9	weight 70:1,6	wrong 44:20 112:11 143:14
understands 75:11	view 7:12 33:21 45:1 52:7,22 54:24 63:10 76:19,24 88:22 89:2,4, 10 90:21 95:4,5 145:7 147:21 149:20,23	weighted 18:14	Y
Understood 87:15	viewed 27:7	west 23:8,14 34:16,22 39:3,15 40:2,14 41:15, 18 57:18,22,24 58:1 63:1 79:14 80:2,6 81:8, 17,18,25 82:1 145:17 147:17	year 104:4
underwent 111:10	viewpoint 63:23	westernmost 33:23	years 17:21,24 18:3,14, 18 22:12 28:1,2 42:5,11 103:7 147:21 149:4,7 153:16
uniform 121:23 122:12	views 95:8	whatsoever 128:4	Yee 9:21,22
Unintelligible 45:14 99:16	visually 105:12 142:17	wide 137:11,17	yesterday 16:20 83:25
unpack 97:18,19	voicemail 36:24	width 137:21	Z
unrelated 150:15	void 94:9,17 99:4,5,10, 25 100:11 101:16	wildfire 18:19 21:8,13, 19 22:10,19	Zamiski 13:13,16,25 14:3,19,21 36:11,16 152:7,17,23 153:4
unusual 75:23	voids 94:5,7 99:17,21 100:2 101:3,8,12	wind 122:21,22 123:5 128:2,20,21,24 129:4,8 141:10,13	zinc 114:16 116:2,4,5,9, 11
upload 145:20	volcanic 66:4,6,10	windy 23:9 24:17 25:3 124:7 130:23	zip 71:9
uploaded 39:9	voltage 85:21 86:7,12 87:2,21 119:4 135:18	wipe 95:21 96:4 98:11, 17	zipped 100:23
uploading 16:7	Volume 7:16 155:24	wipes 96:6	zoom 7:12 11:15 12:7,8 51:21
uppermost 39:18	W	wire 58:10,15,17 59:18 80:3,7 85:22 86:6 87:3 94:6 112:12 125:7 141:21	zoomed 45:8 67:24
usual 10:23 155:19	Wait 50:17 55:14 100:2 104:25 121:4 151:25	wires 58:3 75:2 85:18 91:8 92:3,5 100:3 119:4	
utilities 21:24 22:8	Waiting 145:20	Witt 9:16	
utility 21:14,21,22 22:15,20	walk 24:11 147:6	word 47:2 97:24 98:1 134:9	
V	walked 147:8,11,20	words 60:8 76:7 112:24	
vapor 116:2,9,13,24	walking 144:1	work 14:9 21:7,13,14 28:8 36:17 144:1 149:16 152:24	
vaporized 76:3,4	wanted 46:4 56:5 71:12 91:2 145:13,16 153:7	worked 22:15 153:13	
variables 27:14 30:8 32:13	wanting 110:1		
variety 20:16 145:18	weak 137:23		
vegetation 31:22 33:14 103:21 149:5,6			
verify 146:13			
version 45:6			

Deposition Transcript

Case Number: JCCP No. 5228

Date: February 14, 2024

In the matter of:

MOUNTAIN VIEW FIRE CASES

ARUN KUMAR, PH.D.

**CERTIFIED
COPY**

Reported by:

Cheryl Ortega
CSR No. 13709

Steno
Official Reporters

315 W 9th St.
Suite 807
Los Angeles, CA 90015
concierge@steno.com
(310) 573-8380
NV: FIRM #108F



SUPERIOR COURT OF THE STATE OF CALIFORNIA
COUNTY OF LOS ANGELES - SPRING STREET COURTHOUSE

COORDINATION PROCEEDING SPECIAL)
TITLE (RULE 3.550),)
)
)
MOUNTAIN VIEW CASES) NO. JCCP NO. 5228
)
)
)
_____)

REMOTE VIDEO-RECORDED DEPOSITION OF
ARUN KUMAR
FEBRUARY 14, 2024

REPORTED BY: CHERYL S. ORTEGA, CSR NO. 13709
STENO

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

SUPERIOR COURT OF THE STATE OF CALIFORNIA
COUNTY OF LOS ANGELES - SPRING STREET COURTHOUSE

COORDINATION PROCEEDING SPECIAL)
TITLE (RULE 3.550),)
MOUNTAIN VIEW CASES) No. JCCP NO. 5228
_____)

REMOTE VIDEO-RECORDED DEPOSITION OF ARUN KUMAR,
TAKEN BEFORE CHERYL S. ORTEGA, CSR NO. 13709, A CERTIFIED
COURT REPORTER FOR THE STATE OF CALIFORNIA, COMMENCING AT
9:19 A.M., WEDNESDAY, FEBRUARY 14, 2024.

STENO

1 For subrogation plaintiffs:

Cozen O'Connor

2 By: David D. Brisco, Esq.

Dana Meyers, Esq.

3 Howard Maycon, Esq.

501 West Broadway, Suite 1610

4 San Diego, California 92101

619.234.1700

5 Dbrisco@cozen.com

Dmeyers@cozen.com

6 HMaycon@cozen.com

7

Bauman Loewe Witt & Maxwell, PLLC

8 By: Paul T. Landis, Esq.

8765 East Bell Road, Suite 210

9 Scottsdale, Arizona 85260

480.502.4664

10 Plandis@blwmlawfirm.com

11

Schroeder Loscutoff Stevens, LLP

12 By: William M. Loscutoff, Esq.

Audrey Westerlund, Esq.

13 Amanda Stevens, Esq.

7410 Greenhaven Drive, Suite 200

14 Sacramento, California 95831

916.438.8300

15 Wloscutoff@calsubro.com

Awesterlund@calsubro.com

16 Astevens@calsubro.com

17

Grotefeld Hoffman, LLP

18 By: Lilla Shkolnikov, Esq.

700 Larkspur Landing Circle, Suite 280

19 Larkspur, California 94939

415.344.9670

20 Lshkolnikov@ghlaw-llp.com

21

Berger Kahn

22 By: Craig Simon, Esq.

1 Park Plaza, Suite 340

23 Irvine, California 92614

949.474.1880

24 Csimon@bergerkahn.com

25

STENO

1 Denenberg Tuffley, PLLC
2 By: Paul Casetta, Esq.
28411 Northwestern Highway, Suite 600
3 Southfield, MI 48034
248.549.3900
4 Pcasetta@dt-law.com

5
6 FOR PUBLIC ENTITY PLAINTIFFS:

7 Baron and Budd
8 By: Jason Julius
11440 West Bernardo Court, Suite 265
9 San Diego, California 92127
Jjulius@baronbudd.com

10 FOR INDIVIDUAL PLAINTIFFS:

11 Fox Law APC
12 By: Russ Gold, Esq.
201 Lomas Santa Fe Drive, Suite 420
13 Solana Beach, California 92075
858.256.7616
14 Russ@foxlawapc.com

15 Law Offices of Shawn E. Caine, APC
16 By: Shawn E. Caine
1221 Camino Del Mar
17 Del Mar, California 92014
858.350.1660
Scaine@cainelaw.com
18 Jkirshner@cainelaw.com

19 Spreter & Petiprin, APC
20 By: Geoff Spreter, Esq.
601 3rd Street
21 Coronado, California 92118
619.865.7986
Geoff@spreterlaw.com

22 Robertson and Associates
23 By: Alex Robertson
32121 Lindera Canyon, Suite 200
24 Westlake Village, California 91361
818.851.3852
25 Arobertson@arobertson.com

STENO

1 FOR DEFENDANTS LIBERTY UTILITIES (CALPECO ELECTRIC)
2 LLC AND LIBERTY UTILITIES CO.:

3 Haight Brown and Bonesteel, LLP
4 By: Steven Scordalakis, Esq.
5 Krsto Mijanovic, Esq.
6 555 South Flower Street
7 45th Floor
8 Los Angeles, California 90071
9 213.542.8000
10 Scordalakis@hbblaw.com
11 Kmijanovic@hbblaw.com
12
13
14
15
16
17
18
19
20
21
22
23
24
25

Also Present:

Greg Buhlert, Videographer
Evan Krell, assistant, Berger Kahn

STENO

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

INDEX

PAGE

EXAMINATION BY MR. MIJANOVIC 10

EXHIBITS

PAGE

028-0001 NOTICE OF DEPOSITION AND PRODUCTION 13
OF DOCUMENTS

028-0002 DESIGNATION DISCLOSURE 14

028-0003 OPINIONS 16

028-0004 POWER POINT 30

STENO

1 WEDNESDAY, FEBRUARY 14, 2024

2 9:19 A.M.

3 -000-

4

09:19 5 THE VIDEOGRAPHER: We are on the record. My
09:19 6 name is Greg Buhlert. I'm a notary public contracted by
09:19 7 Steno. I'm not financially interested in this action,
09:19 8 nor am I a relative or an employee of any of the
09:19 9 attorneys or any of the parties.

09:19 10 Today is February 14, 2024. The time is 9:19
09:19 11 a.m. Pacific.

09:19 12 This video deposition is taken remotely via
09:19 13 Steno Connect. The name of the case is Mountain View
09:19 14 cases, filed in the Superior Court of the State of
09:20 15 California for the County of Los Angeles, Case Number
09:20 16 JCCP 5228.

09:20 17 This is the video recorded deposition of Arun
09:20 18 Kumar, PhD, Volume I. The attorney taking this
09:20 19 deposition is Krsto Mijanovic. I will now take the role
09:20 20 of the attorneys, starting with the taking attorney,
09:20 21 Mr. Mijanovic.

09:20 22 MR. MIJANOVIC: Good morning. Krsto Mijanovic
09:20 23 on behalf of Defendant Liberty Utilities.

09:20 24 THE VIDEOGRAPHER: And defending the depo will
09:20 25 be Mr. Brisco.

STENO

09:20 1 MR. BRISCO: Good morning. David Brisco, Cozen
09:20 2 O'Connor, for various subrogation plaintiffs.
09:20 3 THE VIDEOGRAPHER: Okay. Next we have
09:20 4 Mr. Robertson.
09:20 5 MR. ROBERTSON: Good morning. Alex Robertson
09:20 6 on behalf of various individual plaintiffs.
09:20 7 THE VIDEOGRAPHER: Ms. Stevens.
09:20 8 MS. STEVENS: Amanda Stevens, Schroeder
09:20 9 Loscutoff Stevens, for various subrogation plaintiffs.
09:20 10 THE VIDEOGRAPHER: Next will be Ms. Westerlund.
09:20 11 MS. WESTERLUND: Audrey Westerlind, Schroeder
09:20 12 Loscutoff Stevens, for various subrogation plaintiffs.
09:20 13 THE VIDEOGRAPHER: Okay. Next we have
09:21 14 Mr. Simon.
09:21 15 MR. SIMON: Craig Simon, Berger Kahn, for
09:21 16 plaintiffs. Also with me is paralegal Evan Krell with
09:21 17 regard to IT issues.
09:21 18 THE VIDEOGRAPHER: Ms. Meyers.
09:21 19 MS. MEYERS: Dana Meyers, Cozen O'Connor, for
09:21 20 various subrogating plaintiffs.
09:21 21 THE VIDEOGRAPHER: Mr. Spreter.
09:21 22 MR. SPRETER: Geoff Spreter on behalf of
09:21 23 individual plaintiffs.
09:21 24 THE VIDEOGRAPHER: Mr. Maycon.
09:21 25 MR. MAYCON: Howard Maycon, Cozen O'Connor, on
STENO

09:21 1 behalf of various subrogation plaintiffs.

09:21 2 THE VIDEOGRAPHER: Okay. Mr. Julius.

09:21 3 MR. JULIUS: Jason Julius with Baron & Budd for

09:21 4 Public Entity plaintiffs.

09:21 5 THE VIDEOGRAPHER: Okay. Ms. Fox.

09:21 6 Okay. I will move on.

09:21 7 Ms. Shkolnikov.

09:21 8 MS. SHKOLNIKOV: Lilla Shkolnikov of Grotefeld

09:21 9 Hoffman for various subrogating plaintiffs.

09:21 10 THE VIDEOGRAPHER: Okay. Mr. Casetta.

09:21 11 MR. CASETTA: Paul Casetta on behalf of

09:22 12 subrogation plaintiffs.

09:22 13 THE VIDEOGRAPHER: Okay. Mr. Landis.

09:22 14 MR. LANDIS: Paul Landis of Bauman Loewe Witt &

09:22 15 Maxwell on behalf of various subrogating plaintiffs.

09:22 16 THE VIDEOGRAPHER: Mr. Gold.

09:22 17 MR. GOLD: Yes. Russ Gold, Fox Law, also with

09:22 18 Joanna Fox, for various plaintiffs.

09:22 19 THE VIDEOGRAPHER: Okay Mr. Caine.

09:22 20 MR. CAINE: Good morning. Shawn Caine on

09:22 21 behalf of various plaintiffs.

09:22 22 THE VIDEOGRAPHER: Mr. Scordalakis.

09:22 23 MR. SCORDALAKIS: Good morning. Steven

09:22 24 Scordalakis on behalf of Defendant Liberty Utilities.

09:22 25 THE VIDEOGRAPHER: Okay. And Mr. Loscutoff.

STENO

09:22 1 MR. LOSCOTOFF: Bill Loscotoff for subrogating
09:22 2 plaintiffs.

09:22 3 THE VIDEOGRAPHER: Okay. We are ready to
09:22 4 proceed. Our court reporter today is Cheri Ortega with
09:22 5 Steno. Will the reporter please swear in the witness.

09:22 6
09:22 7 ARUN KUMAR,
09:22 8 having been first duly sworn, testified as follows:

09:03 9

09:03 10 EXAMINATION

09:03 11 BY MR. MIJANOVIC:

09:23 12 Q. Good morning, Dr. Kumar.

09:23 13 A. Good morning, sir. How are you?

09:23 14 Q. Fine. Thank you for asking.

09:23 15 You understand that the -- that this is your
09:23 16 deposition as a retained expert in the Mountain View Fire
09:23 17 cases?

09:23 18 A. Yes, sir.

09:23 19 Q. And that you've been retained by the plaintiff
09:23 20 collectively to provide metallurgical opinions; is that
09:23 21 correct?

09:23 22 A. Correct.

09:23 23 Q. Are you prepared to express all the opinions
09:23 24 that you intend to express at the time of trial?

09:23 25 A. Yes.

STENO

09:23 1 Q. Obviously, with the exception of any rebuttal
09:23 2 opinions that Dr. Fowler may have; is that right?

09:23 3 A. That's correct.

09:23 4 Q. Okay. A few minutes before your deposition was
09:23 5 scheduled I received an e-mail from Mr. Brisco containing
09:24 6 a one-page document that itemizes your opinions. It's
09:24 7 entitled, Opinions, Mountain View Fire.

09:24 8 I'll be attaching that as an exhibit, but let
09:24 9 me just ask you, did you prepare that document?

09:24 10 A. Yes, I did.

09:24 11 Q. When did you prepare it?

09:24 12 A. I was working on it for last -- since yesterday
09:24 13 and I finished it this morning.

09:24 14 Q. And during your draft of the opinions, the
09:24 15 one-page document containing your opinions, did you have
09:24 16 any communications with any attorneys on the plaintiffs'
09:24 17 side regarding those opinions?

09:24 18 A. Yes. Yesterday we had a meeting and I
09:24 19 expressed my opinions verbally at that time.

09:24 20 Q. Who was in the meeting?

09:24 21 A. There was several people that I do recall.
09:25 22 Mr. Brisco and Mr. Maycon, for sure. There were three or
09:25 23 four other attorneys. All plaintiff attorneys.

09:25 24 Q. Did any one of those individuals ask you to
09:25 25 prepare a list of opinions?

STENO

09:25 1 A. No, nobody did. But I generally do that so
09:25 2 that it becomes easy in the deposition, that I don't
09:25 3 forget any major opinions.

09:25 4 Q. Of course.

09:25 5 And recognizing that you would be appearing
09:25 6 today to give your deposition and expressing all the
09:25 7 opinions that you intend to express at the time of trial,
09:25 8 was it your intention to list all of the opinions in this
09:25 9 one-page document to -- that way, as you said, you don't
09:25 10 forget any opinions?

09:25 11 MR. SIMON: I'm going to object to the
09:25 12 question -- this is Craig Simon -- on the basis of
09:25 13 vagueness as to all the opinions. Obviously, he's laid
09:25 14 out his major categories.

09:25 15 I may ask him a question at trial in the area
09:26 16 that may not be the exact wording, but I think if you can
09:26 17 clarify your question it would help.

09:26 18 BY MR. MIJANOVIC:

09:26 19 Q. Dr. Kumar, did you understand my question?

09:26 20 A. Yes, I did. And these are the major opinions.
09:26 21 There will be a lot of sub-opinions within that, because
09:26 22 you can't list everything on one page. And as you
09:26 23 mentioned earlier, based on any rebuttal opinions, that
09:26 24 would be added to it.

09:26 25 Q. I also reviewed your Power Point. There were
STENO

09:26 1 over 200 slides in it. Does that Power Point contain
09:26 2 those sub-opinions that you just referenced?

09:26 3 A. Most of them, yes. The Power Point is still
09:26 4 under preparation. I generally prepare that so that I
09:26 5 have a chronological order of what was done and when it
09:26 6 was done and what my major observations were at the time.

09:27 7 So that's what is in the Power Point and still
09:27 8 in the making. It will be finalized before the trial.

09:27 9 Q. All right. So what I'll do is attach as
09:27 10 Exhibit 1 to your deposition the notice of deposition,
09:27 11 which includes a Request for Production of Documents.

09:27 12 Have you had a chance to review that document?

09:27 13 A. Yes, sir.

09:27 14 (Exhibit 028-0001 marked.)

09:27 15 BY MR. MIJANOVIC:

09:27 16 Q. And do we now have your complete file?

09:27 17 A. You sure do, yes.

09:27 18 Q. Are there any -- were there any notes that were
09:27 19 part of your file that you have not produced?

09:27 20 A. No.

09:27 21 Q. And have you produced all your photographs?

09:27 22 A. All of them, yes.

09:27 23 Q. All right. I'm attaching as Exhibit 2 to your
09:27 24 deposition, it's plaintiffs' expert disclosure. Before I
09:28 25 show that to you on the screen, have you had a chance to

STENO

09:28 1 review how you were being disclosed in this case before
09:28 2 the disclosure was served by the plaintiffs?

09:28 3 A. Yes, I have.

09:28 4 (Exhibit 028-0002 marked.)

09:28 5 BY MR. MIJANOVIC:

09:28 6 Q. I'll show you Exhibit 2.

09:28 7 Dr. Kumar, do you see that on your screen?

09:28 8 A. Yes. If you can enlarge it a little bit, would
09:28 9 be nice.

09:28 10 Q. How is that?

09:28 11 A. Perfect. Okay.

09:28 12 Q. Now, this is Exhibit 2, looking at Paragraph
09:28 13 Number 8 of Section B it provides, Dr. Kumar will be
09:28 14 called upon as an expert to offer opinions on liability
09:28 15 and causation within his areas of expertise. And let me
09:29 16 stop right there.

09:29 17 Is your letter -- area of expertise, is that
09:29 18 metallurgy, sir?

09:29 19 A. That is correct.

09:29 20 Q. Do you consider yourself an expert on
09:29 21 reconstruction?

09:29 22 A. No.

09:29 23 Q. Did you conduct any type of reconstruction in
09:29 24 this matter to illustrate line slap?

09:29 25 A. The only reconstruction is based on
STENO

09:29 1 metallurgical observations I have.

09:29 2 Q. All right. Your disclosure -- strike that.

09:29 3 The scope of your expert disclosure goes on to
09:29 4 state that you'll testify on all issues related to
09:30 5 metallurgical observation and finding pertaining to
09:30 6 evidence collected in connection with the investigation
09:30 7 of the Mountain View fire.

09:30 8 When you prepared your Power Point, the one
09:30 9 that you produced with your file that's over 200 slides,
09:30 10 did you try to include photographs and then itemize what
09:30 11 your observations were and your opinions were relating to
09:30 12 whatever was depicted in the photograph?

09:30 13 A. Yes. All of that has been put in the Power
09:30 14 Point, except the last inspection that happened at
09:30 15 Dr. Fowler's place, looking at a place of metal that was
09:30 16 corroded.

09:30 17 Q. Okay. And then your designation goes on to
09:30 18 state that you will also be called upon to opine with
09:31 19 regard to photographs and video testimony and documents
09:31 20 provided by Liberty, its employees and former employees,
09:31 21 third party witnesses and other third parties related to
09:31 22 the Mountain View fire.

09:31 23 With respect to that broad designation does
09:31 24 your list of opinions that you prepared this morning
09:31 25 contain any opinions on that topic?

STENO

09:31 1 A. Not yet, but based on the testimony of all the
09:31 2 other experts for Liberty, that will be appended.

09:31 3 Q. All right. I'm trying to print a PDF of your
09:32 4 Power Point, but it's voluminous and it may take some
09:32 5 time.

09:32 6 A. Yes.

09:32 7 Q. So in the meantime I may refer to it, okay, and
09:32 8 then later on we'll attach it if we're ever successful in
09:32 9 printing it to PDF.

09:32 10 A. That would be fine.

09:32 11 Q. So what I've done, I've attached as Exhibit 3
09:32 12 to your deposition your opinions -- it's a one-page
09:32 13 opinion sheet that you prepared this morning; is that
09:32 14 right?

09:32 15 A. That is correct.

09:32 16 (Exhibit 028-0003 marked.)

09:33 17 MR. MIJANOVIC: Let me take a little detour
09:33 18 here for a second, a housekeeping issue.

09:33 19 That Power Point is over two gigabytes. Is
09:33 20 that something that we can attach in native format as an
09:33 21 exhibit?

09:33 22 MR. BRISCO: That was not for you, Dr. Kumar.
09:33 23 That's for the Steno folks.

09:33 24 THE WITNESS: I understand.

09:33 25 MR. MIJANOVIC: Does Steno -- does Steno know?
STENO

09:33 1 I don't want to break the platform.

09:33 2 MR. McCULLOGH: This is Greg McCullogh. I
09:33 3 believe you can turn on the -- you can upload the file,
09:33 4 it just may take awhile. You just won't be able to
09:33 5 display it through the platform, but you should be able
09:33 6 to upload it.

09:33 7 THE VIDEOGRAPHER: That's correct.

09:33 8 MR. BRISCO: It's up to you, Krsto. Maybe I
09:33 9 would suggest doing a share screen if you want to use it,
09:34 10 and then we deal with the upload at the end, but I don't
09:34 11 know if it's going to mess with your computer while
09:34 12 you're trying to do that.

09:34 13 MR. SIMON: If you send it to Greg McCullogh, I
09:34 14 think he can turn it into a PDF for Krsto.

09:34 15 MR. MIJANOVIC: Yeah. I think you guys should
09:34 16 have it already.

09:34 17 MR. BRISCO: Yeah. It's in the --

09:34 18 MR. MIJANOVIC: Should I do that --

09:34 19 MR. BRISCO: Yeah, I'll --

09:34 20 (Speaking simultaneously.)

09:34 21 MR. MIJANOVIC: -- in the meantime that would
09:34 22 be great.

09:34 23 MR. BRISCO: Yeah. I'll text with Greg and
09:34 24 make sure he has access to it and work with him on it.

09:34 25 MR. MIJANOVIC: All right. All right.
STENO

09:34 1 BY MR. MIJANOVIC:

09:35 2 Q. Sir, so I have on the screen Exhibit 3, which
09:35 3 is a list of opinions. Are you prepared to go through
09:35 4 these opinions?

09:35 5 A. Sure.

09:35 6 Q. So the first opinion you have listed, sir, is
09:35 7 that the field side conductor between pole number one and
09:35 8 pole number two failed at a distance of 133 feet, and
09:35 9 then in parentheses you say, plus the cut section length
09:35 10 from pole number one to ground on the east side. You go
09:35 11 on to state that the failure occurred at prior
09:35 12 progressively fatigued cracks, aluminum strands of the
09:36 13 71 ACR aluminum conductor, steel reinforced conductor.
09:36 14 And then final separation in the steel core with some
09:36 15 tensile necking followed by separation arc.

09:36 16 Is that your first primary opinion?

09:36 17 A. Correct.

09:36 18 Q. You reference that the failure occurred at
09:36 19 prior progressively fatigued cracked aluminum strands.

09:36 20 Can you explain how you went about determining
09:36 21 that?

09:36 22 A. Yes. So when we did the optical microscope and
09:36 23 electron microscope examination of all the cracked
09:36 24 aluminum strands, keep in mind there are multiple,
09:36 25 multiple strands which have cracked, we were only able to

STENO

09:37 1 look at few of them in the electron microscope. But the
09:37 2 balance were all examined in optical microscope.

09:37 3 And combination of those, which is in my Power
09:37 4 Point, by selected photographs, because there were over a
09:37 5 thousand photographs taken. Selected photographs show
09:37 6 different individual strands which have cracked and they
09:37 7 show fatigue cracking prior to this failure.

09:37 8 Q. So you're saying that there was cracking on the
09:37 9 strands of the field side phase before the actual
09:37 10 conductor came down to the ground; is that correct?

09:37 11 A. That is correct, multiple cracks.

09:37 12 Q. And how did you make a determination as to
09:37 13 whether those cracks existed prior to the line coming
09:37 14 down versus existing as a result of the line coming down?

09:38 15 A. Okay. So there are several observations that
09:38 16 combine to give you that final conclusion on that. First
09:38 17 of all, fatigue cracks occur over time. They don't occur
09:38 18 instantly. So fatigue cracks leave different types of
09:38 19 footprint if you want to call it, which under
09:38 20 metallurgical observation would show that they are either
09:38 21 a flat fracture on the strands or an angled fracture,
09:38 22 depending on whether they are a straight fatigue or
09:38 23 torsional fatigue.

09:38 24 Those occur over a long period of time, and
09:38 25 multiple cracks after separation, when they get

STENO

09:38 1 separation arc, because the separation arc only occurs
09:38 2 when the conductor is energized. And that happens after
09:38 3 the separation occurs.

09:38 4 And if the two failed ends are close to each
09:38 5 other, the electricity is still -- it wants to jump
09:39 6 through and causes what is called separation arc.

09:39 7 In other cases where the separation occurs and
09:39 8 the two ends separate very quickly, those surfaces were
09:39 9 oxidized. And oxidation occurs over a period of time.
09:39 10 So you combine these two observations as far as the
09:39 11 fracture goes.

09:39 12 And then the next observation you see is on the
09:39 13 surface to see if there is any side arcing, for example,
09:39 14 by line slapping, or by mechanical damage or by some
09:39 15 other means which may have started fatigue, and none were
09:39 16 found.

09:39 17 We also did not find any major necking of
09:39 18 aluminum conductors.

09:39 19 So in absence of all of those observations and
09:39 20 presence of others, you conclude that they were
09:39 21 progressively fatiguing one by one. And as one aluminum
09:40 22 strand cracks, the second one and the third one goes
09:40 23 after that, because the loads increase on the balance of
09:40 24 the conductor, and the process continues until final
09:40 25 separation.

STENO

09:40 1 Q. So are you able to place a date or an age on
09:40 2 the cracks based on your observations?

09:40 3 A. No, sir. I don't think anybody can.

09:40 4 Q. In other words, can you tell whether a fatigue
09:40 5 crack occurred two years ago versus one year ago versus
09:40 6 six months prior to the fire?

09:40 7 A. No, that is not possible, because oxidation
09:40 8 depends on the environment and the amount of oxygen
09:41 9 attacking the aluminum surface. So all of that becomes
09:41 10 very difficult for anyone to date it.

09:41 11 All we can say is it did not happen at the time
09:41 12 of failure. It happened way before that, because
09:41 13 oxidation takes time.

09:41 14 Q. So when you examined the wire -- well, let's
09:41 15 talk about that. When did you first examine the strands
09:41 16 that had, in your opinion, fatigue cracks that predated
09:41 17 the fire? When did you first examine those conductors?

09:41 18 A. Okay. So that's where the Power Point comes in
09:41 19 handy. The very first examination we did was at BLM
09:41 20 office on September 8, 2021. That was the initial
09:42 21 examination.

09:42 22 Q. Is it your understanding that BLM took
09:42 23 possession of the conductors until those conductors were
09:42 24 produced on September 8, 2021, for the parties to
09:42 25 inspect?

STENO

09:42 1 A. That's my understanding.

09:42 2 Q. And do you have any information as to how BLM
09:42 3 stored the conductors while the conductors were in its
09:42 4 possession?

09:42 5 A. No, I don't.

09:42 6 Q. You understand that this incident occurred
09:42 7 on -- strike that.

09:42 8 You understand that the subject fire occurred
09:42 9 on November 17, 2020; is that correct?

09:42 10 A. Correct.

09:42 11 Q. The incident occurred on November 17, 2020, but
09:42 12 the BLM exam number one occurred on September 8, 2021.
09:42 13 So given that time period are you of the opinion that any
09:43 14 cracks in the strands of wire would be subjected to
09:43 15 oxidation?

09:43 16 A. That certainly would take risk, yes.

09:43 17 Q. And it depends on the environment in which the
09:43 18 conductors were stored; is that correct?

09:43 19 A. That is correct. But that oxidation would be
09:43 20 common to the entire surface, not just the fractured
09:43 21 surface.

09:43 22 Q. You're of the opinion that you would have an
09:43 23 equal amount of oxidation to the surface as well as to
09:43 24 the fractured surface during the time that BLM maintained
09:43 25 possession of the conductors?

STENO

09:43 1 A. That is correct. And if you look at the
09:43 2 surface of the conductor, they are not that oxidized as
09:43 3 compared to the fracture surface.

09:44 4 Q. And because you observed oxidation on the
09:44 5 fractured surface of the strands than on the outer
09:44 6 surface of the strands themselves, you concluded that
09:44 7 greater oxidation on the fractured surface was because
09:44 8 that was exposed to an environment that would have caused
09:44 9 greater oxidation to the fractured surface; is that
09:44 10 right?

09:44 11 A. That is correct.

09:44 12 Q. And so it's just a -- you're, in essence,
09:44 13 observing an area that had more oxidation and concluding
09:44 14 that that crack must have been there before the fire
09:44 15 because that's the only way you can explain the greater
09:44 16 oxidation; is that right?

09:44 17 A. That is correct. And that is coupled with the
09:44 18 fact that the surfaces on -- the fractured surfaces are
09:44 19 typical of fatigue fractures. That does not happen just
09:44 20 by storing it. That had happened before that.

09:45 21 Q. So you're saying that -- strike that.

09:45 22 Did you just say that the fractured surfaces
09:45 23 are a result of fatigue fracture?

09:45 24 A. That is correct.

09:45 25 Q. And when you say fatigue fracture can you
STENO

09:45 1 explain what you mean by that?

09:45 2 A. Fatigue fractures occur with alternating
09:45 3 stresses, where the stresses go up and down repeatedly
09:45 4 over a long period of time. So initially the fatigue
09:45 5 cracks nucleates, which takes a long period of time.
09:45 6 After nucleation they start going, and the growth is what
09:45 7 is seen on the fractured surfaces.

09:45 8 Q. And what is causing the fatigue fracture, if
09:45 9 you have an opinion on that issue?

09:45 10 A. In overhead conductors it is the movement of
09:45 11 the conductors.

09:45 12 Q. So you're of the opinion that the field side
09:46 13 conductor experienced fatigue fractures in the strands
09:46 14 based on the movement of that conductor over time, and
09:46 15 that fatigue fracture occurred prior to the subject fire?

09:46 16 A. Right. And similar observation was done on
09:46 17 center conductor also, by the way.

09:46 18 Q. But is it correct that you're unable to place a
09:46 19 date on when the fatigue fracture occurred on the strands
09:46 20 in relation to the subject fire, correct?

09:46 21 MR. BRISCO: Asked and answered.

09:46 22 You can answer.

09:46 23 THE WITNESS: Yeah. The only answer I can give
09:46 24 you is that those fatigue cracks occurred before the
09:46 25 final fracture during the Mountain View fire.

STENO

09:46 1 BY MR. MIJANOVIC:

09:46 2 Q. So the fatigue fracture could have occurred the
09:46 3 day before; is that correct?

09:46 4 A. No, sir.

09:46 5 Q. All right.

09:46 6 A. It takes more.

09:47 7 Q. It could --

09:47 8 A. Fatigue fractures take a long period of time.

09:47 9 Q. But can you give me a best estimate as to when
09:47 10 the fatigue fractures on the field side phase occurred
09:47 11 prior to the subject fire?

09:47 12 A. I don't believe I can give a date on that.

09:47 13 Q. What -- are you able to give a best estimate?

09:47 14 A. Best estimate is that it happened before the
09:47 15 Mountain View fire because of several observations we
09:47 16 have which is in the Power Point.

09:47 17 Number one, as I mentioned earlier, that the
09:47 18 surfaces are cracked in a manner that are typical of
09:47 19 fatigue, either the torsional fatigue or straight
09:47 20 fatigue. They're oxidized. And some of the ends are
09:47 21 arced, electrically arced, which is called a separation
09:47 22 arc. And that occurs when the conductor is energized
09:47 23 before the failure.

09:47 24 Q. I'm just going back to this question about when
09:48 25 in relation to the fire those fatigue fractures existed.

STENO

09:48 1 Are you able to state to a reasonable degree of
09:48 2 metallurgical science and certainty that those fatigue
09:48 3 fractures were present a year prior to the subject fire?

09:48 4 MR. BRISCO: Objection. Asked and answered
09:48 5 multiple times.

09:48 6 THE WITNESS: I don't believe I can give exact,
09:48 7 or anybody, any metallurgist can, in months or years,
09:48 8 anything like that. The only thing we can answer is that
09:48 9 it takes long period of time. And all conductors,
09:48 10 overhead conductors are known for this kind of failure,
09:48 11 which occurs over several months and years.

09:48 12 BY MR. MIJANOVIC:

09:48 13 Q. Are you able to give an estimate as to the
09:48 14 length of time it takes for the oxidation to build up on
09:48 15 the fractured surface of the strands of the conductor?

09:48 16 A. No, sir. Not exact dates, no.

09:49 17 Q. What about generally speaking, like an
09:49 18 estimate, are you able to do that?

09:49 19 A. Generally speaking, it takes months and years,
09:49 20 yes.

09:49 21 Q. You're not able to narrow it down any more than
09:49 22 that; is that correct?

09:49 23 A. That is correct.

09:49 24 Q. Have you ever given -- have you ever given an
09:49 25 opinion -- just by looking at oxidation on a conductor

STENO

09:49 1 have you ever given an opinion as to how long it would
09:49 2 have taken for that oxidation to build up?

09:49 3 A. I don't recall.

09:49 4 Q. Is that within your expertise to provide an
09:49 5 opinion as to how long it took certain oxidation to build
09:49 6 up on an aluminum strand of a conductor?

09:49 7 A. I have looked at hundreds of conductors over my
09:50 8 career, and the fracture surfaces depend on the time it
09:50 9 takes for oxidation to take place. The oxidation becomes
09:50 10 darker as the time becomes longer. And oxidation is
09:50 11 shinier, if you want to call it that, as compared to the
09:50 12 longer period.

09:50 13 But relatively speaking, you can talk about
09:50 14 those. You can never come up with an exact number,
09:50 15 because it depends on the environmental conditions.

09:50 16 Q. Are you aware of any studies that discuss this
09:50 17 issue by, in essence, placing a date on oxidation present
09:50 18 on a fractured surface of an aluminum strand?

09:50 19 A. I've never seen one.

09:50 20 Q. Would you have to speculate as to whether that
09:51 21 oxidized -- strike that.

09:51 22 Would you have to speculate as to whether the
09:51 23 oxidation on the fractured surface of the aluminum
09:51 24 strands you're referencing were present a month before
09:51 25 the fire occurred versus two years before the fire

STENO

09:51 1 occurred?

09:51 2 A. I'm not speculating any exact number. It could
09:51 3 be months or years.

09:51 4 Q. But you don't know which; is that right?

09:51 5 A. That is correct, sir.

09:51 6 Q. And is that because there are too many factors
09:51 7 involved, for example, environmental conditions, how it
09:51 8 was stored, humidity levels, things of that nature?

09:51 9 A. All of that, yes.

09:51 10 Q. And how many of these fatigue cracked aluminum
09:52 11 strands did you observe where you are of the opinion that
09:52 12 those cracks predated the fire?

09:52 13 A. Many. And if you continue reading in the
09:52 14 opinions you will come to that. Let me see.

09:52 15 If you look at Item Number 4 in the opinions,
09:52 16 within eight and a half feet only -- not the entire
09:52 17 length, we looked at 133 feet. Within only eight and a
09:52 18 half feet there were 25 fractured aluminum strands close
09:52 19 to the main failure on the field side conductor.

09:52 20 Q. So are you of the opinion -- are you of the
09:52 21 opinion that within that eight feet where you have the
09:52 22 approximate 25 fractures, are you of the opinion that
09:52 23 those fractures existed on the field side phase before
09:52 24 the wire went down?

09:53 25 A. That is correct, because fatigue fractures

STENO

09:53 1 don't happen instantly. It takes a long time.

09:53 2 Q. Are you able to direct me in your Power Point
09:53 3 that was part of your file, are you able to direct me to
09:53 4 the slides that depict the oxidized fractures on the
09:53 5 aluminum strands that you believe predated the subject
09:53 6 fire?

09:53 7 A. Sure. Give me a second, please.

09:53 8 Q. Sure.

09:53 9 A. Or a minute maybe.

09:54 10 MR. McCULLOUGH: This is Greg McCullogh.

09:54 11 The -- Dr. Kumar's Power Point has been
09:54 12 uploaded as Exhibit 28-0004 as requested, but remember,
09:54 13 it will not be able to be displayed within the Steno
09:54 14 platform. You'll have to do a screen share to view it.

09:54 15 MR. MIJANOVIC: Thank you. I appreciate that.

09:54 16 MR. SIMON: Any time you need him, Krsto, just
09:54 17 let me know. We'll be glad to do all the technical stuff
09:54 18 for you.

09:54 19 MR. MIJANOVIC: Great. Thank you for that.
09:54 20 That's a lot of help.

09:55 21 THE WITNESS: Okay. Just a few typical ones, I
09:55 22 can identify where they are. I'm sure there are more but
09:55 23 at least I can show you some.

09:55 24 BY MR. MIJANOVIC:

09:55 25 Q. Okay.

STENO

09:55 1 A. If you go to Slide Number 163, please. I don't
09:55 2 know who is going to pull it but --
09:55 3 Q. I can display it, just so we can confirm that
09:55 4 we're looking at the same page. Hang on a second.
09:55 5 A. Sure. Sorry, it's not 163. It's 103. 103.
09:56 6 Q. All right, sir, I'm displaying Slide 103 of
09:56 7 Exhibit 4 on the screen. Do you see it?
09:56 8 A. Yes.
09:56 9 (Exhibit 028-0004 marked.)
09:56 10 BY MR. MIJANOVIC:
09:56 11 Q. Let me see if I can enlarge that a bit. All
09:56 12 right. There you go.
09:56 13 A. Yes.
09:56 14 Q. All right. So I see -- these are two -- do you
09:56 15 want to call them photographs?
09:56 16 A. Micrographs taken in the electron microscope.
09:56 17 Q. Let's focus on the micrograph on the left side.
09:57 18 Please explain what in this micrograph tells you that the
09:57 19 fatigue fracture in your opinion predated the subject
09:57 20 fire?
09:57 21 A. Well, the surface looks oxidized, and the way
09:57 22 you can see that it, you do not see the fractured
09:57 23 surface. You see a flat surface, a fracture, with small
09:57 24 oxidized material on the surface. And the right side is
09:57 25 the back scatter electronic measure at the same location

STENO

09:57 1 taken at 500 times magnification.

09:57 2 So that surface does not show a fracture
09:57 3 surface. It shows an oxidized surface because of these
09:57 4 small outside particles on the surface.

09:57 5 Q. Is there anything else about these two
09:58 6 micrographs that tell you that the fracture depicted in
09:58 7 these two micrographs predated the subject incident?

09:58 8 A. We also took energy dispersive spectrum on the
09:58 9 surface, which is not in the slides at this time, which
09:58 10 shows very high oxygen peak also along the aluminum.

09:58 11 Q. It shows very high what, sir?

09:58 12 A. Oxygen peak. Because just by looking you can't
09:58 13 tell it's aluminum oxide. It could be aluminum chloride,
09:58 14 for example. But when you do EDS analysis, you can tell
09:58 15 if it's an oxide or not. And the EDS analysis, which I
09:58 16 think I'll include in my Power Point eventually.

09:58 17 Q. When you say that the EDS shows a very high
09:58 18 oxygen peak, what's the significance of a very high
09:58 19 oxygen peak to your opinion that these -- that the
09:59 20 fracture depicted in Slide 103 predated the subject fire?

09:59 21 A. So the oxygen, coupled with aluminum, you can
09:59 22 see that's aluminum oxide, and that's what gives you that
09:59 23 conclusion. And the fracture -- see, oxidation occurs
09:59 24 after the fracture. So fracture predates the failure,
09:59 25 because fatigue does not occur instantly. Fatigue occurs

STENO

09:59 1 over long period of time. And that cannot happen by
09:59 2 sitting or mishandling or any type of environmental
09:59 3 control by BLM.

09:59 4 So the fracture had already occurred prior to
09:59 5 oxidation. So you need to go back to the origin of the
09:59 6 surface, how was the surface created. It was created by
09:59 7 a fracture process, not by oxidation process. Oxidation
10:00 8 is a secondary thing that happens afterwards.

10:00 9 Q. So looking at these two micrographs on Slide
10:00 10 103, you are of the opinion that the fracture occurred as
10:00 11 a result of the movement of the conductors over time; is
10:00 12 that correct?

10:00 13 A. Right. By a process of fatigue.

10:00 14 Q. And is there anything in the two micrographs
10:00 15 that would suggest to you that the fractures depicted
10:00 16 occurred as a result of impact?

10:00 17 A. No. There's no impact on this. As a matter of
10:00 18 fact, there are micrographs taken of the conductor on the
10:00 19 surface, those would be before these slides, to show what
10:00 20 the surface condition was before we even went to electron
10:00 21 microscope photos. The surfaces do not show that issue.
10:00 22 Fractures are pretty clean on the surface. When you look
10:01 23 at optical micrograph on the site of these conductors at
10:01 24 the area of the failure.

10:01 25 MR. MIJANOVIC: So we're going to take a short
STENO

10:01 1 break. We're on the hour here and I need to recharge
10:01 2 these earbuds regularly, otherwise, they're going to fail
10:01 3 on me. So let's take --
10:01 4 MR. BRISCO: Ten minutes, Krsto, or how much do
10:01 5 you want?
10:01 6 MR. MIJANOVIC: Ten, please.
10:01 7 MR. BRISCO: Okay.
10:01 8 MR. MIJANOVIC: Thank you.
10:01 9 THE VIDEOGRAPHER: The time is 10:00 a.m. We
10:01 10 are off the record.
10:15 11 (A recess was taken.)
10:15 12 THE VIDEOGRAPHER: The time is 10:15 a.m. We
10:15 13 are back on the record.
10:15 14 BY MR. MIJANOVIC:
10:16 15 Q. Dr. Kumar, we left off discussing these two
10:16 16 micrographs, which are depicted on Slide 103 of
10:16 17 Exhibit 4.
10:16 18 Do you recall that?
10:16 19 A. Yes.
10:16 20 Q. Other than the amount of oxidation that you
10:16 21 observed in these two micrographs, what other evidence
10:16 22 are you relying on to opine that the fracture depicted in
10:16 23 these two micrographs existed on the field side phase
10:16 24 prior to the fire?
10:16 25 A. Okay. For that you need to look at each one of
STENO

10:16 1 these conductor strands, which have failed from the
10:16 2 surface, in optical microscope, and look at the condition
10:16 3 of the failure, the angle of the fracture and other
10:16 4 details. It's not just one micrograph.

10:17 5 Before we go further, if you recall my
10:17 6 testimony that the oxidation could be studied by EDS
10:17 7 analysis, as a matter of fact in my Power Point I do have
10:17 8 another one, just on Page 111 of my Power Point.

10:17 9 Q. Before we -- before we leave these two
10:17 10 micrographs, do you have the EDS analysis for these two
10:17 11 that we can reference?

10:17 12 A. I may have it in the file, I don't have it in
10:17 13 the Power Point. But another one I have in the Power
10:17 14 Point.

10:17 15 Q. Let's go to the one that you want to go to. Is
10:17 16 it five -- 111?

10:17 17 A. 111. Yes, please.

10:17 18 Q. All right.

10:17 19 All right. So I have on the screen two
10:18 20 micrographs depicted on Slide 111 of Exhibit 4; is that
10:18 21 correct?

10:18 22 A. Correct. So this one also showed oxidation on
10:18 23 the surface. And then the next slide shows the EDS
10:18 24 analysis of the surface, which is 112.

10:18 25 Q. So before we leave Slide 111, you're of the
STENO

10:18 1 opinion that the fracture depicted on this aluminum
10:18 2 strand depicted on Slide 111 existed before the subject
10:18 3 fire; is that correct?

10:18 4 A. That is correct.

10:18 5 Q. And is it the same answer that you don't know
10:18 6 how many months or years before, but you just know it was
10:19 7 before, correct?

10:19 8 A. That is correct.

10:19 9 Q. Is there anything else, any other significance
10:19 10 in these two micrographs that support that opinion, other
10:19 11 than the level of oxidation that you're observing?

10:19 12 A. Yes. The right slide is at 500 magnification,
10:19 13 which is equivalent to the previous slide that we saw.
10:19 14 You see the oxidation on the surface. And then when the
10:19 15 you the EDS analysis you get more information, which is
10:19 16 in the next slide, which is 112.

10:19 17 Q. So now we're looking at Slide 112, and this
10:19 18 relates to the two micrographs depicted in Slide 111; is
10:19 19 that correct?

10:19 20 A. Yes. It is taken on that fractured surface.
10:19 21 The fractured surface EDS analysis shows the chemical
10:19 22 composition. And the three main elements you see here
10:20 23 are aluminum, oxygen and zinc.

10:20 24 So the interesting information that you get
10:20 25 here is that the zinc vapors they deposit from the arced

STENO

10:20 1 surface on to the fractured surface, that means the
10:20 2 fracture had to be occurring at or before for the zinc to
10:20 3 deposit.

10:20 4 Now, zinc deposit comes in from the steel core,
10:20 5 which is in the center, which is steel coated with zinc
10:20 6 for corrosion prevention. And when you do the arcing the
10:20 7 zinc vaporizes, because the zinc vapor melting point is
10:20 8 very low. It vaporizes and gets on to the fractured
10:20 9 surface.

10:20 10 So what we have here is aluminum oxide along
10:20 11 with zinc oxide side on the surface.

10:20 12 Q. Let me see if I can paraphrase that.

10:20 13 So you're of the opinion that the presence of a
10:20 14 zinc deposit on the fractured mark on the aluminum strand
10:21 15 indicates the fracture occurred prior to the fire because
10:21 16 that zinc deposit can only come from the zinc coating on
10:21 17 the steel core?

10:21 18 A. After arcing because zinc has to vaporize to
10:21 19 redeposit on the surface.

10:21 20 Q. So --

10:21 21 A. And for that, energy need -- this end needs to
10:21 22 energize. And keep in mind this is on the -- on the --
10:21 23 let me see. This is Item Number 1, which is on the east
10:21 24 pole, and after failure you don't have that kind of
10:21 25 arcing capability on that surface, because that side does

STENO

10:21 1 not have the same energy as the failed side on pole
10:21 2 number two.

10:21 3 Q. So are you of the opinion that the fracture on
10:21 4 the aluminum strand depicted in Slide 111 was near a
10:22 5 location where there was an arcing event with the steel
10:22 6 core; is that correct?

10:22 7 A. Correct. That is correct.

10:22 8 Q. And as a result of that arcing on the steel
10:22 9 core you would have vaporized zinc coating on that steel
10:22 10 core, deposit on the fracture of the aluminum strand; is
10:22 11 that correct?

10:22 12 A. Yes, sir.

10:22 13 Q. And so you're of the opinion that because the
10:22 14 deposit of the zinc on that fracture of the aluminum
10:22 15 strand occurred, that the fracture must have predated
10:22 16 the -- it must have predated the subject fire by some
10:22 17 months or years; is that correct?

10:22 18 A. Right. And also predated the arcing on the
10:23 19 steel core. And keep in mind that this location is where
10:23 20 actual separation occurred.

10:23 21 Q. All right. Any other -- do you have any other
10:23 22 observations that support your opinion that the fracture
10:23 23 predated the subject fire by some months or years, other
10:23 24 than the EDS analysis, as well as the micrograph you
10:23 25 referenced on Slide 111?

STENO

10:23 1 A. Oh, a lot more than that.

10:23 2 First of all, this is a fatigue fracture.

10:23 3 Fatigue fractures don't occur in one day or one instant.

10:23 4 It occurs over a period of time. So the fracture had to
10:23 5 occur in fatigue first before all this happens.

10:23 6 Q. You're saying that the fatigue fracture had to
10:24 7 occur first to create the spacing along the fracture for
10:24 8 the zinc deposit to reach that area?

10:24 9 A. You got it, yes.

10:24 10 Q. But you don't know -- you're not able to date
10:24 11 or age that fatigue fracture. The best that you can say
10:24 12 is it occurred months or years prior to the fire; is that
10:24 13 correct?

10:24 14 MR. BRISCO: Asked and answered.

10:24 15 THE WITNESS: That's correct.

10:24 16 BY MR. MIJANOVIC:

10:24 17 Q. Okay. Sir, do you have any other examples
10:24 18 where you can reference micrographs, as well as related
10:24 19 EDS analysis to support the same opinion?

10:24 20 A. I think we have several of these, except they
10:25 21 cannot all go in the Power Point because of it's already
10:25 22 200 plus slides. So if you want individual ones I think
10:25 23 they can be pulled out from my actual file.

10:25 24 Q. Let me see if I can ask it this way. When you
10:25 25 went through the analysis of the field side conductor
STENO

10:25 1 looking at these fractures on the aluminum strands were
10:25 2 you categorizing the fractures in terms of whether they
10:25 3 preexisted the day of the fire?

10:25 4 A. All the fatigue fractures preexisted before the
10:25 5 fire, because they occur over a period of time.

10:25 6 Q. How many fractures do you estimate predated the
10:25 7 fire? And I'm focusing on these aluminum strands.

10:25 8 A. Many. So in the slide -- let me see one. If
10:26 9 you go to Slide Number 21, please.

10:26 10 Q. What's the significance of Slide 21?

10:27 11 A. A lot. And the reason being -- reason being
10:27 12 you have so many of these aluminum conductor strands that
10:27 13 have failed near the main failure area, which is on the
10:27 14 left side, which shows failure area west. This is actual
10:27 15 separation point of the conductor connected to pole
10:27 16 number one.

10:27 17 So at the end it shows 3-4. That means you
10:27 18 have three aluminum conductors at one location and then
10:27 19 other four a little bit further, six inches away from it.
10:27 20 And then you have two. Then another two. Then another
10:27 21 four. Another -- so all of these combined give you 25
10:27 22 aluminum conductors all within eight and a half feet.

10:27 23 And there were several more beyond on the right
10:27 24 side towards the east pole.

10:27 25 So this area has a lot more failed conductors
STENO

10:28 1 as compared to the balance of it, but the balance of it
10:28 2 also has it. So we found failed aluminum strands on the
10:28 3 right side of this section that I'm showing here and on
10:28 4 the left side on Item Number 2 also, away from the failed
10:28 5 area there were several.

10:28 6 And then similar failures were on center
10:28 7 conductor in different locations. So if you look at the
10:28 8 total number, I don't have it in front of me, but there
10:28 9 will be way beyond 50, I would say, if you combine all of
10:28 10 them.

10:28 11 Q. And just referencing the 25 aluminum conductor
10:28 12 strands that failed within eight and a half feet from the
10:28 13 failed west end, are those documented in your file
10:28 14 somewhere where we can locate the 25?

10:28 15 A. Yes. They are actually in the same slide. If
10:28 16 you just go back on the slides, I'll show you each one of
10:29 17 them.

10:29 18 So if you go --

10:29 19 Q. I'm just looking -- I'm just looking for slide
10:29 20 numbers that I can associate these 25 aluminum conductor
10:29 21 strands to the photos somewhere in your file?

10:29 22 A. Absolutely. So if you go to Slide Number 12.

10:29 23 Q. All right.

10:29 24 A. So in Slide Number 12 what you have is three
10:29 25 failed aluminum conductors. This is on the main failure.

STENO

10:29 1 So if you recall on the slide I had 3-4, so these are the
10:29 2 three from that.

10:29 3 Q. Okay. Thank you.

10:29 4 A. Then the next slide will show the other four
10:29 5 failed aluminum strands, which is Slide Number 13. So
10:29 6 here we see four aluminum and one steel, this is the main
10:30 7 failure area.

10:30 8 Then the next one slide would be Slide
10:30 9 Number 14, which is at one foot nine inch on that slide,
10:30 10 and we see two failed conductors. You can see the two
10:30 11 aluminum. The top one shows the black arcing also, which
10:30 12 is the arcing damage while it's energized.

10:30 13 Next Slide Number 15 shows another two failed
10:30 14 aluminum conductors.

10:30 15 If you go to the next one, 15.

10:30 16 Q. All right.

10:30 17 A. You can see the two failed aluminum conductors
10:31 18 separated and they're melted at the end by parting arc.

10:31 19 Then you go on to --

10:31 20 Q. Let me stop you there.

10:31 21 On Slide 15, the two separated conductors that
10:31 22 are melted at the end, you're of the opinion that that
10:31 23 occurred prior to the fire?

10:31 24 A. Way before fire, yes.

10:31 25 Q. All right. And how long before the fire are
STENO

10:31 1 you able to date these conductors in terms of when that
10:31 2 occurred?

10:31 3 A. No, I cannot date these 25 failed strands as to
10:31 4 when they failed, one after the other.

10:31 5 Q. All right. Go ahead, sir.

10:31 6 A. So next slide would be 16. And here, you can't
10:31 7 see all of them, but there are four aluminum conductors
10:31 8 that have failed. And you can see the black arc, which
10:32 9 tells you that they were energized after fatigue fracture
10:32 10 occurred, which is caused by the parting arc.

10:32 11 Next slide would be at five feet six inches,
10:32 12 which is Slide Number 17. Here you see --

10:32 13 Q. All right. Go ahead.

10:32 14 A. -- the two failed aluminum conductors.

10:32 15 Q. Okay.

10:32 16 A. Next slide is at Slide Number 15 at six feet
10:32 17 three inches.

10:32 18 Q. Slide 18?

10:32 19 A. Next one, 16. No. 18. I'm sorry. 18, you're
10:32 20 right.

10:32 21 Q. Go ahead.

10:33 22 A. This one shows another two failed aluminum
10:33 23 conductors here and then bent over.

10:33 24 And then next Slide Number 19 has four failed
10:33 25 aluminum conductors. And this one shows the black

STENO

10:33 1 arcing. The one before this. I think you can jump to
10:33 2 Slide 19.

10:33 3 Q. I'm on Slide 20 now.

10:33 4 A. Yeah. If you go back to 19, please.

10:33 5 Q. Okay.

10:33 6 A. 19 has four failed aluminum conductors and all
10:34 7 of them have black separation arc. And if you look at
10:34 8 the left side you can see a little bit bird caging also
10:34 9 there.

10:34 10 And now, if you go to Slide 20, it --

10:34 11 MR. SIMON: And, Cheri, did you get the word
10:34 12 bird caging?

10:34 13 THE REPORTER: I did. That's been in other
10:34 14 depositions. Thank you, though.

10:34 15 THE WITNESS: Okay. Good.

10:34 16 And Slide Number 20 shows another failed two
10:34 17 conductor strands at eight feet six inches.

10:34 18 So that -- then you go to the next slide and
10:34 19 that's a compilation of all of these slides together,
10:34 20 which shows the 25 strands. And they show the distance
10:35 21 where the photographs are taken.

10:35 22 BY MR. MIJANOVIC:

10:35 23 Q. Thank you.

10:35 24 And is there corresponding EDS analysis for all
10:35 25 of these or is it just some of them?

STENO

10:35 1 A. Not each one of them because it's just too
10:35 2 many.

10:35 3 Keep in mind, this is examination being done on
10:35 4 day one in the field at BLM. Eventually all of the
10:35 5 conductors were sent to EAG Laboratories and electron
10:35 6 microscope studies were done on some of these, not all of
10:35 7 them.

10:35 8 Q. So with respect to these 25 aluminum conductors
10:35 9 are you of the opinion that all of them exhibit fatigue
10:35 10 fractures, in other words, the reason they fractured was
10:35 11 due to fatigue?

10:35 12 A. That is correct. Fatigue. Some show oxidation
10:35 13 on the surface. Some show arcing on the surface by the
10:35 14 parting arcs. So those are all typical of fatigue
10:36 15 fractures.

10:36 16 Q. Are any of these 25 related to the subject
10:36 17 incident after the line separated and struck other lines
10:36 18 or struck the ground?

10:36 19 A. No, sir.

10:36 20 Q. Are there any other slides, Dr. Kumar, of --
10:36 21 that supports your opinion that these 25 aluminum
10:36 22 conductor strands that you went over from Slide 12 to
10:37 23 Slide 20 are related to fatigue fractures that predate
10:37 24 the incident?

10:37 25 A. Yeah. The seven strands which are actual
STENO

10:37 1 failure and they were examined in detail in the electron
10:37 2 microscope. So those were done. And then some of these
10:37 3 other ones were examined in detail in the electron
10:37 4 microscope in the lab, and they're photographs as you go
10:37 5 in the Power Point.

10:37 6 Q. All right. We started off with your first
10:37 7 opinion, and I'm referring to the one-page list of
10:38 8 opinions that's marked as Exhibit 3. And so we started
10:38 9 off focusing on this first opinion that you had, that the
10:38 10 failure occurred at prior progressively fatigue cracked
10:38 11 aluminum strands, and that then the final separation of
10:38 12 the steel core occurred.

10:38 13 Is that -- are you describing, for instance,
10:38 14 what occurred at the separation point?

10:38 15 A. Right.

10:38 16 Q. All right.

10:38 17 A. And -- and behind it. We covered another
10:38 18 opinion also while we were discussing this Item Number 4,
10:38 19 I believe.

10:38 20 Q. When you say Item Number 4 are you saying
10:38 21 bullet point four?

10:38 22 A. Yes. Bullet point number four. Remember, we
10:39 23 talked about all those 25 conductors, strands.

10:39 24 Q. Understood. Thank you.

10:39 25 So focusing on Exhibit 3, if you go down to the
STENO

10:39 1 fourth bullet point, that opinion is that there were 25
10:39 2 fractured aluminum strands within eight and a half feet
10:39 3 of the failed end of the conductor toward pole number
10:39 4 one. What you're telling me is we just went over that
10:39 5 opinion and your support for that opinion by referencing
10:39 6 Slides 12 through 20; is that correct?

10:39 7 A. And a few others, yes.

10:39 8 Q. All right. Thank you, sir.

10:39 9 Now, as part of this fourth bullet point
10:40 10 opinion that starts off -- starts off referencing the 25
10:40 11 fractured aluminum strands, the last sentence of that
10:40 12 opinion states, several failed ends of the aluminum
10:40 13 strands show dark discoloration due to arcing, indicating
10:40 14 that the fatigue failures occurred while the conductor
10:40 15 was fully energized prior to the final failure.

10:40 16 Do you see that?

10:40 17 A. Yes.

10:40 18 Q. The reference to the conductor being fully
10:40 19 energized prior to the final failure, are you referring
10:40 20 to that event occurring at some time before the subject
10:40 21 fire?

10:40 22 A. Yes, sir.

10:40 23 Q. So the conductor being fully energized prior to
10:40 24 the final failure, the final failure that you're
10:40 25 referring to is not on November 17, 2020, it's at some

STENO

10:41 1 point, whether it be months or years, prior to the date
10:41 2 of November 17, 2020; is that correct?

10:41 3 A. Yes, sir.

10:41 4 MR. MIJANOVIC: Okay. I got some feedback
10:41 5 there for a moment. Did the court reporter capture the
10:41 6 question and answer on that?

10:41 7 THE REPORTER: Yes, I did. It sounded like
10:41 8 wind chimes but I got everything.

10:41 9 BY MR. MIJANOVIC:

10:41 10 Q. Sir, going back to Exhibit 3, that first
10:42 11 opinion indicates that the failure occurred at prior
10:42 12 progressively fatigued cracked aluminum strands of the
10:42 13 ACSR conductor and then final separation in the steel
10:42 14 core with some tensile necking following by a separation.

10:42 15 That last clause, that last sentence you're
10:42 16 talking about the final separation in the steel core with
10:42 17 some tensile necking followed by a separation arc, are
10:42 18 you referring to the steel core separating as part of
10:42 19 this incident?

10:42 20 A. Yes.

10:42 21 Q. And when you reference the separation of the
10:43 22 steel core with some tensile necking, what does that
10:43 23 mean?

10:43 24 A. So if you go back to the process you have seven
10:43 25 aluminum strands surrounding the center steel core. As

STENO

10:43 1 all seven aluminum strands separate, all the loading is
10:43 2 going through the steel center core, as well as the
10:43 3 electricity wants to go through the steel core as well.
10:43 4 But steel core gets resistance heating, because it is not
10:43 5 as good a conductor as aluminum is. So by resistance
10:43 6 heating that area becomes hot.

10:43 7 And when steel becomes hot it becomes more
10:43 8 ductile. And when it becomes ductile it will start
10:43 9 pulling because the conductor is still holding the entire
10:44 10 strand together, the entire line together. So then it
10:44 11 starts pulling, and that pulling causes the tensile
10:44 12 necking while the separation is taking place in a ductile
10:44 13 manner at an elevated temperature and of the steel core.
10:44 14 And then final separation. And as soon as it separates
10:44 15 it creates arcing because the electricity still wants to
10:44 16 jump through.

10:44 17 Q. So at the point of this separation of this
10:44 18 steel conductor are you describing a scenario where all
10:44 19 seven aluminum strands have already separated at that
10:44 20 location?

10:44 21 A. Correct.

10:44 22 Q. And when you say the aluminum strands have
10:44 23 separated at the location where the steel core separated,
10:44 24 is the separation of the aluminum strands bird caging or
10:44 25 is it actual fractures along all seven strands?

STENO

10:44 1 A. These are actual fractures. Now, one of the
10:44 2 aluminum strands may have stayed along with the steel and
10:45 3 separated at the end as well. It's not that all seven
10:45 4 had completely separated. Because if you look at the
10:45 5 ends, one of the aluminum strands shows a ductile failure
10:45 6 also. So it could have been that only five or six of
10:45 7 them have failed and fatigued, and then one aluminum and
10:45 8 steel eventually fails at the very end.

10:45 9 Q. And you're describing the tensile necking
10:45 10 occurring as a result of heating of the steel due to the
10:45 11 energized conductor; is that right?

10:45 12 A. Yeah. Due to resistance heating, yes.

10:45 13 Q. So you're describing aluminum strands being
10:45 14 separated and thereby not being able to conduct the
10:45 15 energy. Now the energy is going through the steel core,
10:45 16 causing resistance heating and necking thereafter; is
10:45 17 that right?

10:45 18 A. Yes, sir.

10:45 19 Q. Now, was there -- the tensile necking that you
10:46 20 observed was that at the actual separation point of the
10:46 21 steel core?

10:46 22 A. That is correct.

10:46 23 Q. And before there was separation -- well, strike
10:46 24 that.

10:46 25 Was the separation of the steel core due to the
STENO

10:46 1 tensile necking or was it also due to line slap?

10:46 2 A. No. Due to tensile necking.

10:46 3 Line slap occurs only on the outer surface of
10:46 4 aluminum strands, not on the steel core, because it is
10:46 5 covered by seven aluminum on all sides. So if you see
10:47 6 line slapping, it would be on the outer surface of the
10:47 7 aluminum strands. And none of these seven strands at the
10:47 8 failure point show anything, any surface arcing due to
10:47 9 line slap.

10:47 10 Q. So you're of the opinion that the steel core
10:47 11 separated on the field side phase due to tensile necking
10:47 12 that resulted from a high resistance -- that resulted
10:47 13 from high resistance as a result of some of the aluminum
10:47 14 strands being separated and having less of an ability or
10:47 15 no ability to conduct electricity or energy; is that
10:47 16 right?

10:47 17 A. And hold the load also.

10:47 18 Q. All right. Do you have an opinion as to
10:47 19 whether the steel core in and of itself was designed to
10:47 20 withstand any of the load on its own without the strands
10:48 21 themselves?

10:48 22 A. It can hold the load if it is not heated. At
10:48 23 room temperature it will be okay. But as I said, when
10:48 24 energy is going through the conductor, as aluminum
10:48 25 strands separate the energy wants to go through whatever

STENO

10:48 1 is left over. The steel is still a conductor but not as
10:48 2 good conductor as aluminum is. So you get resistance
10:48 3 heating in that location where you have severed aluminum
10:48 4 strands. And that becomes soft and that's why it cannot
10:48 5 take the load anymore.

10:48 6 Q. And do you know the threshold level of
10:48 7 resistance heating that's necessary to soften the steel
10:49 8 core, such that you're compromising its ability to hold
10:49 9 the load?

10:49 10 A. I haven't seen any study like that and I
10:49 11 haven't done any.

10:49 12 Q. All right. So when you say that resistance
10:49 13 heating resulted in the steel core to become soft, do you
10:49 14 know at what point that occurred?

10:49 15 A. At -- at the very end of separation time. As
10:49 16 soon as all the aluminum strands have given up and maybe
10:49 17 even just one left over, the loading is going to
10:49 18 concentrate on the remaining steel and aluminum, whatever
10:49 19 is left there. And since all the energy wants to go
10:49 20 through there, there will be resistance heating, because
10:49 21 it's not conducting uniformly along the seven conductors
10:49 22 as it was supposed to.

10:49 23 Q. Have you done any calculations on your opinion
10:50 24 as to the level of resistance heating necessary to soften
10:50 25 that core and ultimately result in the tensile necking

STENO

10:50 1 you described?

10:50 2 A. No, sir.

10:50 3 Q. Have you -- strike that.

10:50 4 Are you aware of any studies that discuss this
10:50 5 topic?

10:50 6 A. I have not seen any. I've seen describing the
10:50 7 same way as I'm describing, but not any calculations, if
10:50 8 you want to call it that.

10:50 9 Q. Have you yourself done any independent testing
10:50 10 to confirm your theory?

10:50 11 A. This has been seen many times on many other
10:50 12 occasions. This is not the first time.

10:50 13 Q. But have you done testing of your own, in other
10:50 14 words, sending a certain amount of energy just through
10:50 15 the steel core that didn't have intact strands
10:51 16 surrounding the steel core, and then you would actually
10:51 17 witness the tensile necking and softening of that steel
10:51 18 core?

10:51 19 A. No, sir.

10:51 20 Q. Were you able to calculate the tensile force on
10:51 21 the field side steel conductor before separation?

10:51 22 A. No, sir.

10:51 23 Q. Did you assume a certain amount of tensile
10:52 24 force on that steel core prior to separation?

10:52 25 A. Qualitatively the amount of loading will keep
STENO

10:52 1 increasing as the aluminum strands are severing. So it
10:52 2 will keep increasing in that direction.

10:52 3 Q. But aside from it -- aside from it keeping
10:52 4 increase -- strike that.

10:52 5 You're of the opinion that the more aluminum
10:52 6 strands are fractured the greater the tensile force on
10:52 7 the steel core; is that correct?

10:52 8 A. Greater the tensile force on the steel core and
10:52 9 the remaining aluminum, as well as the electricity going
10:52 10 through will start concentrating in that area where the
10:52 11 aluminum strands have severed.

10:52 12 Q. Have you ever performed any calculations as to
10:52 13 how much more tensile force is being exerted on that
10:53 14 steel core, as -- as that ACSR wire loses the aluminum
10:53 15 strands that surround the core?

10:53 16 A. No, I have not.

10:53 17 Q. And how many aluminum strands in your opinion
10:53 18 were fractured around the area where the field side phase
10:53 19 separated due to the tensile necking?

10:53 20 A. Okay. Let me look at one more photograph here.

10:53 21 So the answer to that is four to five aluminum
10:54 22 strands have already severed before this final failure.
10:54 23 And the way I answered that question is by looking at
10:54 24 Slide Numbers 12 and 13.

10:54 25 Q. Okay. I have up on the screen Slide 12, the
STENO

10:54 1 three failed aluminum strands associated with the west
10:54 2 end field side phase. Were those at the separation point
10:55 3 of the field side phase?

10:55 4 A. Yes. They are one separation point, yes.

10:55 5 Q. So my question is, were these three stands
10:55 6 depicted on Slide 12, were those actually located in the
10:55 7 area where the steel core separated due to tensile
10:55 8 necking as you described?

10:55 9 A. No. Steel core was about six inches behind it.

10:55 10 Q. On which side?

10:55 11 A. On the right side of the photographs.

10:55 12 Q. You said the steel core was six inches behind
10:55 13 it. I'm envisioning that the steel core separated due to
10:55 14 tensile necking six inches away from the fractured
10:56 15 aluminum strands depicted in Slide 12, and I want to
10:56 16 know, is it six inches west or east of the location where
10:56 17 you have the aluminum strands depicted in Slide 12?

10:56 18 A. East, towards the east. To -- to show it I
10:56 19 want to show you another slide where both ends are
10:56 20 together, not separated like this, so it's easy to
10:56 21 visualize that way.

10:56 22 Q. Thank you.

10:56 23 A. Give me a second, please.

10:56 24 Q. Yes.

10:57 25 A. You can kindly pull Slide Number 69. So in 69
STENO

10:58 1 the slide that you have on the screen right now you can
10:58 2 see the right side is Item Number 1 and left side is Item
10:58 3 Number 2 coming together. And the very end of Item
10:58 4 Number 1 on top are the three aluminum strands, which is
10:58 5 in the Figure A at the very top in the middle somewhere.

10:58 6 And then the balance of the aluminum
10:58 7 conductors, four of them, and the steel core is on the
10:58 8 right side, where the end, the black mark end is. The
10:58 9 black mark end is the one from Item Number 2, which is on
10:58 10 the ground.

10:58 11 Q. Thank you, sir.

10:58 12 A. Sure.

10:58 13 And then if you want to go one step further,
10:59 14 maybe I'll take you there now before you ask the
10:59 15 question. Figure 168 I think gives some more depiction
10:59 16 of that.

10:59 17 Q. One --

10:59 18 A. Slide Number 168. 168.

10:59 19 So in this slide I have tried to put the two
10:59 20 ends together. The BLM Item Number 4 is connected to the
10:59 21 west pole number two on the left side, and then BLM Item
10:59 22 Number 1 is connected to the right side, which shows the
10:59 23 three aluminum and four aluminums and steel at one point.

10:59 24 And then if you match it, the arc end of the
10:59 25 two aluminum and steel are where the four aluminum steel

STENO

10:59 1 are on the other one. So they're --

10:59 2 Q. Slide 168, this supports your first opinion on
11:00 3 Exhibit 3; is that right?

11:00 4 A. That is correct, it does.

11:00 5 Q. Okay. Did you locate any evidence of line slap
11:00 6 at the location of where Item 1 and Item 2 separated?

11:00 7 A. There was no line slap in this area. There
11:00 8 were line slap in other locations but not here.

11:00 9 Q. Where the steel core -- strike that.

11:01 10 Do you have photographs of the steel core or
11:01 11 micrographs or the steel core for both ends of where
11:01 12 Item 1 and Item 2 connected?

11:01 13 A. Yes. Yes, I do.

11:03 14 You can start at Slide Number 1 -- 105. So in
11:03 15 105 you can see the second failed location. Remember,
11:03 16 the three aluminum strands separate which are fried at
11:03 17 the bottom and cut on the left side, but on the top you
11:04 18 can see there are four aluminum and one steel right in
11:04 19 the center of the photograph.

11:04 20 And then the next slide after this shows a
11:04 21 detail of the steel with the tensile necking. This is
11:04 22 the left photograph on the top. And then we have
11:04 23 electron microscope views of that as well done later in
11:04 24 the study.

11:04 25 Q. What slide is that?

STENO

11:04 1 A. I'm looking for that. Just one moment, please.
11:05 2 Okay. That will be Slide Number 122. Where in
11:06 3 this photograph on the left side of the micrograph you
11:06 4 can see the tensile necking, and then on the right side
11:06 5 you can see a little detailed view of the fractured end
11:06 6 and the tensile necked area.

11:06 7 Q. And do you have the corresponding side that
11:06 8 connected to this steel core on Slide 122?

11:06 9 A. Yes. So that will be on Item Number 2.

11:06 10 Now, Item Number 2 was so badly oxidized we did
11:06 11 not do electron microscope work on that, but there are
11:06 12 optical photos and I'll show you that.

11:07 13 Actually, we did. So if you go to Slide
11:07 14 Number 150. 150, please.

11:07 15 This is the mating end on Item Number 2, which
11:07 16 is browned and discolored. But still you can see them
11:07 17 necking in the fractured surface at the end of the steel
11:07 18 core.

11:08 19 Q. Was this a separation of the steel core that
11:08 20 resulted in the line to go down?

11:08 21 A. Yes, sir.

11:08 22 MR. MIJANOVIC: Okay. I see we're at 11:07.
11:08 23 Why don't we take another short break and come back at
11:08 24 about 11:17.

11:08 25 MR. BRISCO: Sounds good.
STENO

11:08 1 THE VIDEOGRAPHER: The time is 11:08. We are
11:08 2 off the record.

11:19 3 (A recess was taken.)

11:19 4 THE VIDEOGRAPHER: The time is 11:19 a.m. We
11:20 5 are back on the record.

11:20 6 BY MR. MIJANOVIC:

11:20 7 Q. We are back from a break, Dr. Kumar. Are you
11:20 8 ready to proceed?

11:20 9 A. Yes, sir.

11:20 10 Q. Going back to Exhibit 3, which is your list of
11:20 11 opinions, I have them on the screen. We're going to the
11:20 12 second bullet point where you opine that after failure
11:20 13 and separation the energized failed end toward pole
11:20 14 number two on the west side fell and arced with ground,
11:21 15 creating a fire with arcing damage at and near the failed
11:21 16 end of the brown discoloration over a long length of the
11:21 17 downed conductor.

11:21 18 Do you see that?

11:21 19 A. Yes, sir.

11:21 20 Q. The part of this opinion where you opine that
11:21 21 the west side fell and arc with ground creating a fire,
11:21 22 that portion that the downed energized west side
11:21 23 conductor caused a fire, what is the causation of that
11:21 24 based on?

11:21 25 A. So I looked at the photographs taken by
STENO

11:21 1 Cal-Fire during their investigation, as well as Jeffrey
11:22 2 Hinds, H-i-n-d-s, his video and photographs, and based on
11:22 3 that it looks like there's a lot of dry brush in the area
11:22 4 where the conductor fell on the -- just next to the road.
11:22 5 And if you have energized end of conductor, the
11:22 6 electricity coming from the west side, that end is still
11:22 7 energized while it hits the ground, so you get what is
11:22 8 basically arcing between the phase to ground. And that
11:22 9 arcing is strong enough to create a fire for dry brush.

11:22 10 Q. As a metallurgist do you ordinarily provide --
11:22 11 ordinarily provide origin and cause opinions?

11:22 12 A. I'm not opining on origin and cause at all.
11:22 13 What I'm opining here is that we have a live energized
11:22 14 conductor end, which is hot. And when it arcs, because
11:23 15 we have arcing spot on the end and on the side, when it
11:23 16 arcs it will create enough heat for a fire to ignite.

11:23 17 Q. All right. So you're of the opinion that
11:23 18 there's sufficient energy there to ignite a fire,
11:23 19 assuming you have a competent fuel package that it comes
11:23 20 into contact with; is that right?

11:23 21 A. That is totally correct.

11:23 22 Q. And do you know where exactly in the field the
11:23 23 separated end of that west conductor, where that first
11:23 24 landed on the ground?

11:23 25 A. I don't know where it first landed, because

STENO

11:23 1 there was a lot of wind and it was moving around if I
11:23 2 recall the video taken by Mr. Hinds, but that was taken
11:23 3 after failure obviously. So exactly at the time of
11:24 4 failure, I don't know exactly where it went down.

11:24 5 MR. SIMON: And this is Craig Simon. I want to
11:24 6 just try to get us all on the same page. It's an
11:24 7 objection on vague and ambiguous.

11:24 8 When you say failed end in your question,
11:24 9 Krsto, are you talking about from the pole to the tip,
11:24 10 that's the failed end, as opposed to the failed tip?

11:24 11 Could you have the question read back,
11:24 12 Ms. Reporter?

11:24 13 (The question was read as follows:

11:23 14 Q And do you know where exactly in the
11:23 15 field the separated end of that west conductor,
11:23 16 where that first landed on the ground?)

11:24 17 MR. SIMON: Okay. So separated end was the
11:24 18 word you used. Could you help us with whether you mean
11:24 19 the entire strand from the separation point back to the
11:25 20 part laying on the ground, or are you talking about just
11:25 21 the tip or otherwise in your question?

11:25 22 BY MR. MIJANOVIC:

11:25 23 Q. Dr. Kumar, did you under understand my
11:25 24 question?

11:25 25 A. Yeah. I think you said failed end. So the end
STENO

11:25 1 means the entire length toward the end, not just the tip.

11:25 2 Q. Well, let's start off with Mr. Simon's request
11:25 3 for clarification. Do you know where the tip of the west
11:25 4 side conductor that fell to the ground, do you know where
11:25 5 the tip of that conductor made contact with the ground?

11:25 6 A. Not exactly, no. It made contact with the
11:25 7 ground, that much we know. There's arcing at the tip and
11:26 8 arcing on the side several inches behind that tip also.
11:26 9 So all of that tells you that that entire area was arcing
11:26 10 with the ground.

11:26 11 Q. So based on the electrical activity from the
11:26 12 tip and some distance back from the tip of that west
11:26 13 conductor, you can tell that there was electrical
11:26 14 activity due to contact with the ground; is that
11:26 15 accurate?

11:26 16 A. Right. And that arcing is on the surface,
11:26 17 which is typical of arcing with the ground.

11:26 18 Q. But as far as the location along the ground
11:26 19 where that arcing occurred, is it correct that you don't
11:26 20 have an opinion in that regard?

11:26 21 A. That is correct.

11:26 22 Q. Your third bullet point indicates after failure
11:27 23 the failed end of the conductor toward pole number one on
11:27 24 the east side shows no arcing of the failed end with
11:27 25 ground for any mechanical damage.

STENO

11:27 1 Do you see that?

11:27 2 A. Yes.

11:27 3 Q. Is that your way of simply saying there's no
11:27 4 electrical activity on the east side of that downed
11:27 5 conductor?

11:27 6 A. After the failure.

11:27 7 Q. After the line went down, correct?

11:27 8 A. Correct.

11:27 9 Q. Going back to that second bullet point where
11:28 10 you reference arcing damage at and near the failed end
11:28 11 and brown discoloration over a long length of the downed
11:28 12 conductor, that brown discoloration, do you have an
11:28 13 opinion as to what caused that?

11:28 14 A. The brown discoloration only without arcing
11:28 15 would be when the conductor is laying on the ground and
11:28 16 there's fire around it basically.

11:28 17 Q. So the brown discoloration is evidence that the
11:28 18 conductor was resting in an area where combustibles
11:29 19 reached open flame and were impinging on the conductor
11:29 20 itself?

11:29 21 A. That would be correct.

11:29 22 Q. The fourth bullet point refers to that 25
11:29 23 fractured aluminum strands that we covered?

11:29 24 A. Yes.

11:29 25 Q. The last sentence of that opinion indicates

STENO

11:29 1 several failed ends of the aluminum strands show a dark
11:29 2 discoloration due to arcing indicate that the fatigue
11:29 3 failures occurred while the conductor was fully energized
11:29 4 prior to the final failure.

11:29 5 My question to you is, on this one, the dark
11:30 6 discoloration, could any of that dark discoloration
11:30 7 simply have been caused by the fire?

11:30 8 A. No, sir. These are very localized right at the
11:30 9 tip where the fracture is. And I think we've gone
11:30 10 through those slides, but if you want I can pinpoint
11:30 11 again where I'm talking about.

11:30 12 Q. No, that's fine. I think you covered it
11:30 13 earlier. I just wanted that clarification.

11:30 14 A. Yeah. And this discoloration is blackish in
11:30 15 nature and not brownish in nature, by the way, from
11:30 16 arcing.

11:30 17 Q. Right. And your opinion didn't have that level
11:30 18 of detail, which is why I was following up.

11:30 19 A. Got it.

11:30 20 Q. The next bullet point indicates, although there
11:30 21 is evidence of line slapping on the field side and center
11:30 22 conductors, there is no line slapping in the failure area
11:30 23 of the field side conductor.

11:31 24 Are you -- are you saying that there's no
11:31 25 evidence of the field side conductor slapping with the

STENO

11:31 1 center phase?

11:31 2 A. No. I'm saying it is not slapping in the area
11:31 3 of failure. It is slapping, and there's evidence of
11:31 4 slapping elsewhere, but not in the area of the failure.

11:31 5 Q. Did you participate in reconstructing the
11:31 6 placements of the field side phase next to the center
11:31 7 phase to be oriented in the fashion that you believe they
11:31 8 were oriented when they were up in the area prior to the
11:31 9 fire?

11:31 10 A. There was an attempt made by all the experts at
11:31 11 BLM, which is one of the slides I have in my Power Point
11:32 12 also, where people lined up all the conductors where they
11:32 13 thought it was as it would have been up in the air.

11:32 14 Q. What slide is that?

11:32 15 A. Okay. That would be Slide Number 58.

11:34 16 Q. All right. I have Slide 58 up on the screen.
11:34 17 Do you see it?

11:34 18 A. Yes, sir.

11:34 19 So this was done at BLM where things were laid
11:34 20 on the ground approximately in the same position. The
11:34 21 top two failed ends are BLM Item Number 1 and 2, right
11:35 22 one being on the east side, left one being on the west
11:35 23 side. Then the one conductor below, which has wrapping
11:35 24 on it, has some arcing, which is the center conductor.
11:35 25 And the one at the bottom is the roadside conductor.

STENO

11:35 1 Q. Did you participate in the decision making on
11:35 2 how to orient these items, Item 1 and Item 2, in relation
11:35 3 to that center conductor, did you participate in that
11:35 4 process?

11:35 5 A. Yes, I did.

11:35 6 Q. And how did you make a determination on how to
11:35 7 line up those three items?

11:35 8 MR. SIMON: I'm going to object to the question
11:35 9 as vague and ambiguous and misstates evidence. You just
11:35 10 said how did you make the determination, but the previous
11:35 11 question is did you participate. So any answer he gives
11:35 12 you as to how it was done is going to be with putting it
11:36 13 as his only determination, and I think it's an unfair
11:36 14 question.

11:36 15 Could you rephrase?

11:36 16 MR. MIJANOVIC: Sure.

11:36 17 BY MR. MIJANOVIC:

11:36 18 Q. Dr. Kumar, what involvement did you have, if
11:36 19 any, in contributing to the discussion of aligning
11:36 20 Items 1 and 2 with Item Number 3 as depicted in Slide 58
11:36 21 of Exhibit 4?

11:36 22 A. Okay. So everyone knows that Item Number 3 of
11:36 23 the BLM was at an unknown distance. It was a 26-feet
11:36 24 long section with some arcing on it, but it did not have
11:36 25 any marking on it as to where it was cut. So people were

STENO

11:36 1 sliding it back and forth, left to right, to see where it
11:37 2 lines up.

11:37 3 And the consensus of the group was that there
11:37 4 was some arcing in this area, which may be aligned with
11:37 5 this area, and it was selected and further investigated
11:37 6 back in the lab where we found that the arcing in the
11:37 7 center conductor in that location where the failure is,
11:37 8 is not consistent.

11:37 9 Q. Are you saying that the ultimate decision that
11:37 10 the group made in terms of how to line up these three
11:37 11 items, based on that decision there was no corresponding
11:37 12 arc on the center phase to correspond with the separation
11:37 13 point of Item Number 1 and Item Number 2?

11:37 14 A. Right. Because this was further examined in
11:37 15 the lab. When he examine in the lab we lined up again in
11:37 16 the same location, and we found the arcing that we see on
11:37 17 the center conductor was not at that same location, it
11:37 18 was further away.

11:37 19 Q. And because the -- there's no corresponding arc
11:38 20 on the center conductor to correspond with the separation
11:38 21 point of Item 1 and Item 2, did you consider that maybe
11:38 22 the group didn't line them up properly?

11:38 23 A. That's a possibility, but I am only looking
11:38 24 from the metallurgical standpoint, because there was one
11:38 25 question whether the separation occurred at a slapping

STENO

11:38 1 point between the two. And the line slap between center
11:38 2 and field side conductor, had it happened in that
11:38 3 location, we would see evidence of line slap on the
11:38 4 failed ends of the field conductor, which we did not
11:38 5 find.

11:38 6 Q. So you're saying regardless of the orientation
11:39 7 of the center conductor, there was no evidence at the
11:39 8 separation point of the field side phase to support line
11:39 9 slap at that location?

11:39 10 A. That is correct.

11:39 11 Q. Was there any evidence of line slap on the
11:39 12 field side phase anywhere remote to the separation point?

11:39 13 A. Yes, there was.

11:39 14 Q. Where was that?

11:39 15 A. On the center conductor.

11:39 16 Q. On the field side phase.

11:39 17 A. Oh, on the field side.

11:39 18 On the field side there is a lot of slapping
11:39 19 near pole number two, which was examined and I have tons
11:39 20 of photographs in my presentation also in the -- I'll
11:40 21 show you which photographs they are.

11:40 22 Q. Other than the evidence of line slap near pole
11:40 23 number two, was there any evidence of line slap along the
11:40 24 field side conductor at any point along the span?

11:40 25 A. Somehow I recall there was and I'm trying to
STENO

11:40 1 find a slide which may show that.

11:41 2 MR. SIMON: And, Krsto, I don't know if he was
11:41 3 looking for something else when you then asked him a
11:41 4 question while he was looking and now he's looking for
11:41 5 what you're asking for. It's hard to tell.

11:41 6 THE WITNESS: Craig --

11:41 7 BY MR. MIJANOVIC:

11:41 8 Q. Dr. Kumar, can you tell us what you're
11:41 9 searching for?

11:41 10 A. I understood the question that is there any
11:41 11 line slap on the field conductor away from or near pole
11:41 12 number two; is that correct?

11:41 13 Q. Yes, sir. Yes, sir.

11:41 14 A. So that's what I'm trying to look for.

11:42 15 MR. BRISCO: I'll just add while he's looking
11:42 16 an objection. It's vague and ambiguous, because we have
11:42 17 a splice in that location, but presuming your question
11:42 18 means outside of the splice on the field side phase.

11:42 19 THE WITNESS: Okay. Slide Number 108. 108.

11:42 20 BY MR. MIJANOVIC:

11:42 21 Q. All right. What's the significance of
11:42 22 Slide 108?

11:42 23 A. So Slide 108 shows the surface melted spots,
11:43 24 which are typical of line slapping because they are on
11:43 25 the upper surface of the aluminum strands on one side

STENO

11:43 1 only.

11:43 2 Q. How far is this location from the point of
11:43 3 separation?

11:43 4 A. Let me look at that. It's close to it but not
11:43 5 at it.

11:44 6 If you go to Slide Number 104, the right side
11:44 7 photograph where the tie is, it's near that. So it's
11:44 8 going to be about six inches from the failed end, from
11:44 9 one failed end, and 12 inches from the other failed end.

11:44 10 Q. So the evidence of line slap on the field side
11:44 11 phase is six inches from the failed end?

11:44 12 A. Six inches from one failed end. Remember,
11:44 13 there are two failed ends here, one with the four
11:44 14 aluminum and steel frame and the other with the three
11:45 15 aluminum strands, which are even six inches beyond.

11:45 16 Q. And let's just take that one at a time.

11:45 17 So the failed end on the east side, how far
11:45 18 away from that failed end are the indicators of
11:45 19 line slap?

11:45 20 A. Okay. So if you look at the first photograph
11:45 21 here, A, on the left side on the slide that is -- that
11:45 22 you have. The very left is the three failed ends. So
11:45 23 from there it is about 12 inches. And then there are the
11:45 24 four failed ends, which would be about four inches from
11:45 25 there.

STENO

11:45 1 Q. So based on how the center phase and the field
11:46 2 side phase were oriented by the parties as a group, of
11:46 3 which you participated, is it your opinion that there was
11:46 4 no corresponding evidence of line slap on the center
11:46 5 phase?

11:46 6 A. There's no corresponding line slap in the
11:46 7 center phase in the area of the failure.

11:46 8 Q. Was there a corresponding area on the center
11:46 9 phase for the areas depicting line slap in Slide 104?

11:46 10 A. It would be more in Slide Number 108. So this
11:47 11 area, which is away from the failed end, could correspond
11:47 12 to the line slap on center conductor.

11:47 13 Q. And the arc spots in Slide 108, how far is that
11:47 14 from the separation point?

11:47 15 MR. BRISCO: Objection. Asked and answered.
11:47 16 Go ahead.

11:47 17 THE WITNESS: We just answered that. It's
11:48 18 12 inches from one end and four inches from the other
11:48 19 end.

11:48 20 BY MR. MIJANOVIC:

11:48 21 Q. All right. Thank you.

11:48 22 A. Sure.

11:48 23 Q. I just wanted to give David an opportunity to
11:48 24 object.

11:48 25 MR. BRISCO: You're doing so well, Krsto, I had
STENO

11:48 1 to make sure you know I was paying attention.

11:48 2 THE WITNESS: It looks like everybody is paying
11:48 3 attention, so that's good.

11:48 4 BY MR. MIJANOVIC:

11:48 5 Q. Yeah. All right. The next bullet point of
11:49 6 your exhibit -- of Exhibit 3, which contains the opinions
11:49 7 that you itemized for us, indicates that failed and arced
11:49 8 ends of the aluminum strands on both field side and
11:49 9 center conductors failed due to fatigue as evidenced by
11:49 10 flat fractures and torsional fatigue with angled flat
11:49 11 fractures followed by either oxidation or separation
11:49 12 arcing and melting.

11:49 13 Do you see that?

11:49 14 A. Yes, we have discussed that.

11:49 15 Q. So in this paragraph you're describing failed
11:49 16 and arced ends of aluminum strands on the center
11:49 17 conductor; is that right?

11:50 18 A. On both field side and center.

11:50 19 Q. So are you of the opinion that the center
11:50 20 conductor contained failed strands due to fatigue?

11:50 21 A. Yes, at many locations.

11:50 22 Q. And maybe I missed this earlier, but the 25
11:50 23 instances of failed aluminum strands due to fracture that
11:50 24 predated the fire, how many of those 25 were associated
11:50 25 with the center conductor?

STENO

11:50 1 A. None. Those were all on the field side.

11:50 2 Q. So how many of -- how many instances of
11:51 3 fractured aluminum strands that predated the fire did you
11:51 4 find on the center phase?

11:51 5 Q. Okay.

11:52 6 A. So we start at Slide Number 196. 196.

11:52 7 So this is the first location. Item Number 3,
11:52 8 by the way, is the center conductor. That is that
11:53 9 26-foot length section that they had cut out. And this
11:53 10 one had a broken conductor, separated aluminum end, and
11:53 11 one tiny little one half an inch long section. Both ends
11:53 12 were arced on the long one and the short one. And they
11:53 13 separated during the handling at the lab. When they were
11:53 14 being unwrapped these just fell out. But that's one.

11:53 15 Then the next one shows at Slide Number 202.
11:53 16 You can see how aluminum strands are cracked, at least
11:53 17 three of them you can see on this side.

11:53 18 And then the next slide shows a different
11:54 19 location, which is 202.

11:54 20 Q. 203?

11:54 21 A. I mean 203. Sorry.

11:54 22 You can see how they are broken. These are all
11:54 23 in the center conductor and they are arced, and you can
11:54 24 see the blackening at the end.

11:54 25 And you go to 204. 204, actually, is the same

STENO

11:54 1 conductor, just rotated on the back side.

11:54 2 And then 205 is another location. Here you can
11:54 3 see broken conductors with melted ends arced, and no line
11:55 4 slap in this area.

11:55 5 So those are the original ones in that 26-foot
11:55 6 section.

11:55 7 Q. You're of the opinion that these broken strands
11:55 8 on the center conductor predated the subject fire?

11:55 9 A. Correct. Because this conductor was still up
11:55 10 in the air.

11:55 11 Q. Are there any others related to that center
11:55 12 conductor?

11:55 13 A. There might be but we only examined in detail
11:56 14 the 26-foot section that was cut out by BLM.

11:56 15 Q. Sir, we're going to go to your next opinion on
11:56 16 Exhibit 3. It reads, the field side conductor also
11:57 17 revealed line slapping damage with surface arcing from
11:57 18 approximately nine feet to 21 feet from the west end near
11:57 19 pole two, consistent with arcing with the service line
11:57 20 after failure. There was one splice on the surface drop
11:57 21 conductor indicating prior repair.

11:57 22 Do you see that?

11:57 23 A. Yes, sir.

11:57 24 Q. Now, the reference to prior repair, was that in
11:57 25 your opinion a repair as a result of the November 17,

STENO

11:57 1 2020, incident, or was that a repair that existed prior
11:57 2 to the subject fire?

11:57 3 A. It existed before that.

11:57 4 Q. Before the fire?

11:57 5 A. Right. Because the line was taken down right
11:57 6 after the fire.

11:57 7 Q. The service drop was taken down right after the
11:57 8 fire?

11:57 9 A. That's my understanding, yes.

11:57 10 Q. The -- your opinion that the field side
11:58 11 conductor also revealed line slap damage with service
11:58 12 arcing from approximately nine feet to 21 feet, and you
11:58 13 associate that with the contact of the service line, are
11:58 14 you indicating that after the field side phase failed
11:58 15 that there was a recoil of the west side of that field
11:58 16 side phase that made contact with the neutral on the
11:58 17 service line?

11:58 18 A. That's exactly correct.

11:58 19 Q. What do you base that on? Did you just
11:58 20 correlate, you know, an arc mark on the neutral to
11:58 21 service line to a location on the west side field side
11:58 22 phase?

11:58 23 A. No. You can't locate exact which arc mark was
11:59 24 created by the field line. But there are multiple arcing
11:59 25 spots in that area between nine feet and 21 feet from the

STENO

11:59 1 west end. Keep in mind there's additional distance
11:59 2 because there was some distance I understand from the
11:59 3 pole down to the ground to be added to this number.

11:59 4 So it would be close to pole number two, and
11:59 5 when the recoil takes place it will contact multiple
11:59 6 locations. It could be on the pole. It could be on
11:59 7 the -- anything else. But nonetheless, there was arcing
11:59 8 on the service line, which cannot be consistent with any
11:59 9 other surface conductors touching in that location, other
11:59 10 than the failed end.

12:00 11 MR. MIJANOVIC: I think this is a good stopping
12:00 12 point for a quick lunch. 30 minutes or what does
12:00 13 everyone think?

12:00 14 MR. BRISCO: Dr. Kumar, is 30 minutes okay with
12:00 15 you?

12:00 16 THE WITNESS: Yes, that's okay.

12:00 17 Krsto, can I ask you, how long more you think
12:00 18 you need to go?

12:00 19 MR. MIJANOVIC: Probably another hour.

12:00 20 THE WITNESS: Okay. Then that's fine.

12:00 21 MR. MIJANOVIC: Okay. All right. See you guys
12:00 22 back at about 12:30.

12:00 23 THE WITNESS: Okay.

12:00 24 MR. BRISCO: Thank you.

12:00 25 THE VIDEOGRAPHER: The time is 12:00 p.m. We
STENO

12:00 1 are off the record.

12:29 2 (Lunch recess.)

12:29 3 THE VIDEOGRAPHER: The time is 12:34 p.m. We
12:34 4 are back on the record.

12:34 5 BY MR. MIJANOVIC:

12:34 6 Q. All right. Dr. Kumar, we are back on the
12:34 7 record from a short lunch.

12:34 8 Thus far, are there any opinions that you would
12:34 9 like to change that you expressed in the first part of
12:34 10 your deposition before we took a lunch?

12:34 11 A. No, sir.

12:34 12 Q. I believe we left off where you opined that the
12:35 13 field side conductor recoiled and made contact with that
12:35 14 service drop; is that right?

12:35 15 A. Yes, sir.

12:35 16 Q. The next opinion is that both the field side
12:35 17 and center conductors between pole one and pole two had
12:35 18 multiple fractured conductor strands. And let me just
12:35 19 stop there in terms of that opinion.

12:35 20 The multiple fractured conductor strands, is
12:35 21 that what you've been testifying to thus far in terms of
12:35 22 the fractures in the field side and center conductors
12:35 23 that predated the subject fire?

12:36 24 A. That is correct.

12:36 25 Q. You also -- as part of your opinion you

STENO

12:36 1 indicated that the both the field side and center
12:36 2 conductors between pole one and pole two also had
12:36 3 numerous arcing spots due to line slapping. Stopping
12:36 4 there in terms of that opinion.

12:36 5 Is that your opinion, that there was evidence
12:36 6 of multiple arcing spots due to line slapping, that
12:36 7 evidence, does that predate the fire or is that as a
12:36 8 result of this fire?

12:36 9 A. The line slapping has to be predated, because
12:36 10 both lines need to be energized for that.

12:36 11 Q. So you're indicating that the field side phase
12:36 12 and the center phase had multiple spots due to line slap
12:36 13 that predated the November 17, 2020, incident?

12:37 14 A. Correct.

12:37 15 Q. And where -- where are the photos that evidence
12:37 16 that?

12:37 17 A. There are quite a few in my Power Point slides.
12:37 18 We showed you some of them but not all of them. I can --
12:37 19 I can tell you where the line slaps spots would be, for
12:37 20 example, in center conductor, we can show you Slide
12:37 21 Number 206, 207.

12:38 22 Q. All right. Let me just put it up on the screen
12:38 23 here.

12:38 24 A. Okay. Yeah. 206, please.

12:38 25 Q. All right. I have 206 on the screen. So the
STENO

12:38 1 two photographs there, where was -- where did you find
12:38 2 that evidence along the center conductor?

12:38 3 A. That is -- keep in mind this was a 26-foot long
12:38 4 section. So we don't know exactly where BLM cut it, but
12:38 5 they placed about the center of the conductors. And from
12:38 6 one end it's 19 feet 11 inch to 20 feet two inches.

12:38 7 Q. So you don't know where the center 20-foot
12:38 8 piece section of conductor that's depicted in 206, you
12:39 9 don't know where that was along the center phase; is that
12:39 10 correct?

12:39 11 A. That is correct.

12:39 12 Q. But the arcing that was evidenced on that
12:39 13 20-foot center phase that was identified as Item 3, is it
12:39 14 your opinion that the arc spotting on that 20-foot piece
12:39 15 of center conductor was not related to the November 17,
12:39 16 2020, event?

12:39 17 A. That is correct.

12:39 18 MR. BRISCO: I'll object as vague and ambiguous
12:39 19 as to related to. He testified earlier it isn't in the
12:39 20 failure area.

12:39 21 MR. MIJANOVIC: Well, let me just clarify the
12:40 22 question.

12:40 23 BY MR. MIJANOVIC:

12:40 24 Q. Dr. Kumar, in Slide 206 there's two photographs
12:40 25 depicting arc spotting; is that right?

STENO

12:40 1 A. Yes.

12:40 2 Q. Do you have an opinion as to whether that arc
12:40 3 spotting occurred as a result of the downed line that
12:40 4 occurred on November 17, 2020?

12:40 5 A. No. It happened prefire.

12:40 6 Q. And when you say it happened prefire, when
12:40 7 prefire? Are you able to date it?

12:40 8 A. No, I cannot date it. It would have to be when
12:40 9 it was energized and contacted the adjacent conductor.

12:40 10 Q. So when the field side phase came down, if that
12:41 11 field side phase was energized and made contact with the
12:41 12 center phase would the arc spotting be consistent with
12:41 13 that event?

12:41 14 A. It will be only consistent on the Item Number 2
12:41 15 connected or toward pole number two, because pole number
12:41 16 one would not have the energy for that.

12:41 17 Q. So when the field side phase separated, the
12:41 18 separated part attached to the pole number one would not
12:41 19 be energized; is that right?

12:41 20 A. It would not have energy to cause arcing, yes.

12:41 21 Q. You're saying the east side conductor attached
12:42 22 to pole one could not have caused the arc spotting
12:42 23 depicted in Slide 206; is that accurate?

12:42 24 A. That is accurate. And it's possible that this
12:42 25 arcing occurred with the roadside conductor, which had

STENO

12:42 1 been replaced before.

12:42 2 Q. So what are the options that the arc spotting
12:42 3 occurred with the roadside phase as well as the field
12:42 4 side phase while it was energized?

12:42 5 A. Metallurgically I cannot differentiate between
12:42 6 the two. But since roadside conductor has been replaced,
12:42 7 there's no way of knowing it.

12:42 8 Q. So are you able to state to a reasonable degree
12:42 9 of scientific certainty as to which conductor made
12:43 10 contact with the center phase to result in the arc
12:43 11 spotting depicted in Slide 206?

12:43 12 A. From the location shown here, since it is not
12:43 13 consistent with the same distance on the field side
12:43 14 conductor, it is more likely than not that it contacted
12:43 15 the roadside and arced.

12:43 16 Q. You cut out there, I caught bits and pieces of
12:43 17 that?

12:43 18 MR. MIJANOVIC: Cheri, did you hear all that?

12:43 19 THE REPORTER: I did, would you like me to read
12:43 20 it.

12:43 21 MR. MIJANOVIC: Yes, please.

12:43 22 (The record was read as follows:

12:43 23 A From the location shown here, since it
12:43 24 is not consistent with the same distance on the
12:43 25 field side conductor, it is more likely than

STENO

12:43 1 not that it contacted the roadside and arced.)

12:44 2 BY MR. MIJANOVIC:

12:44 3 Q. Sir, when you say it's not consistent with the
12:44 4 field side conductor, why do you hold that opinion?

12:44 5 A. Because there's no corresponding spot on the
12:44 6 field side in that location that BLM had identified.

12:44 7 Q. You continue on in your opinion stating that
12:44 8 both -- well, strike that.

12:44 9 Let me just restate your penultimate opinion
12:44 10 here.

12:44 11 Both the field side and center conductors
12:44 12 between pole one and pole two had multiple fractured
12:45 13 conductor strands, numerous arcing spots due to line
12:45 14 slapping and repaired spliced sleeves, indicating old and
12:45 15 aged conductors that should have been replaced similar to
12:45 16 the roadside conductor.

12:45 17 Do you see that?

12:45 18 A. Yes.

12:45 19 Q. So your conclusion that the field side and
12:45 20 center phase were old and aged conductors, is that based
12:45 21 on the fractured strands and arc spotting that you
12:45 22 described earlier in the opinion?

12:45 23 A. That is correct.

12:45 24 Q. Do you have an opinion as to the reason for the
12:45 25 repair splice sleeves?

STENO

12:45 1 A. I unfortunately don't know because I haven't
12:46 2 seen the records of when and how they were repaired. But
12:46 3 repairs are always done when there is a section of the
12:46 4 conductor which is not good because of either prior
12:46 5 fractures that they had seen in the inspection and they
12:46 6 cut that section out and put new one in.

12:46 7 And they have done that in the center
12:46 8 conductor, as well as in the field side conductor. So
12:46 9 both shows splice. The only one that had no splice was
12:46 10 the roadside. It was new from one end to the other and
12:46 11 no arcing.

12:46 12 Q. Your last opinion on Exhibit 3 indicates, any
12:47 13 equipment, for example, spacers, dampeners, that reduces
12:47 14 vibration in the conductors, will reduce the conductors'
12:47 15 stresses for fatigue fractures and eliminate line
12:47 16 slapping.

12:47 17 Do you see that?

12:47 18 A. Yes, sir.

12:47 19 Q. What's that opinion based on?

12:47 20 A. Well, fatigue fractures occur when you have
12:47 21 higher amount of movement in the conductor under load due
12:47 22 to a different wind conditions over a period of time. So
12:47 23 when you -- when you combine the conductors then all
12:47 24 three phases will have to move together, which makes it a
12:47 25 little more difficult in wind as compared to single

STENO

12:48 1 conductor.

12:48 2 So it reduces the amount of oscillation and
12:48 3 vibration, and that will cause reduced amount of
12:48 4 stresses, which will reduce the fatigue fractures.

12:48 5 As far as line slapping is concerned, when the
12:48 6 distance is maintained, you do not slap between the two
12:48 7 lines because of the spacers in between.

12:48 8 Q. And given your opinion that spacers and
12:48 9 dampeners would have eliminated some of these risks, is
12:48 10 that something that's within your purview as a
12:48 11 metallurgist?

12:48 12 A. As a metallurgist over the last 40 years, I
12:48 13 worked with many transmission and electrical engineers in
12:48 14 these fire cases, and this is what their solution has
12:48 15 been recommended. So this is from that. It's not a
12:48 16 metallurgical opinion, but it is a peripheral opinion
12:49 17 that I have the experience with.

12:49 18 Q. So you have historical experience working with
12:49 19 experts in the utility industry that had the expertise in
12:49 20 this area, and you obtained your knowledge from working
12:49 21 with them over time; is that accurate?

12:49 22 A. That's accurate.

12:49 23 Q. And so your opinion is based on views held by
12:49 24 experts in the utility industry with whom you've worked
12:49 25 with as a metallurgist; is that right?

STENO

12:49 1 MR. BRISCO: I'm just going to object to the
12:49 2 question as vague, when you say your opinion, as if
12:49 3 you're categorizing that entire length of that opinion.
12:49 4 He's talking about a portion of the opinion where he
12:49 5 gathered the opinion from other experts. Certainly as a
12:49 6 metallurgist, Kumar can talk about the vibrational
12:49 7 effects on metal parts from vibration alone.

12:49 8 But go ahead, if you understand, you can
12:50 9 answer.

12:50 10 MR. SIMON: Do you understand -- I'm
12:50 11 objecting -- this is Craig -- on that same basis. Vague
12:50 12 and ambiguous.

12:50 13 Krsto, I think if you ask him whether as a
12:50 14 metallurgist he knows whether vibration will reduce
12:50 15 fatigue, that's different than asking him, do you know
12:50 16 whether dampeners or spacers will reduce vibration. So
12:50 17 when you say your opinion, I'm not sure what you mean.

12:50 18 MR. MIJANOVIC: Madame Court Reporter, can you
12:50 19 just read back the question?

12:50 20 (The record was read as follows:

12:49 21 Q And so your opinion is based on views
12:49 22 held by experts in the utility industry with
12:49 23 whom you've worked with as a metallurgist; is
12:51 24 that right?)

12:51 25 THE WITNESS: And my answer, is that what we're
STENO

12:51 1 waiting for?

12:51 2 BY MR. MIJANOVIC:

12:51 3 Q. Yes, sir, if you understand the question.

12:51 4 A. Yes. So as a metallurgist, and if you read it
12:51 5 carefully it says, any equipment that reduces vibration.

12:51 6 So anything that reduces vibration will reduce the

12:51 7 fracture and fatigue, which is metallurgical opinion.

12:51 8 How this equipment works is not my expertise,
12:51 9 but it will -- if any equipment that reduces vibration,
12:51 10 it will reduce fatigue.

12:51 11 Also, if the distance is maintained between the
12:51 12 two lines then line slapping will be stopped. That's
12:51 13 general engineering. You don't have to be a metallurgist
12:51 14 for that one.

12:51 15 Q. So with respect to your use of vibration and
12:52 16 conductors, that phrase in that last opinion, do you hold
12:52 17 the opinion that the fractures that you observed, for
12:52 18 example, in the field side phase, that those fractures
12:52 19 were caused by vibrations in the conductor that is the
12:52 20 field side phase?

12:52 21 A. Yes. And the vibration would be induced by the
12:52 22 wind over a period of time.

12:52 23 Q. So the fractures you testified about earlier as
12:52 24 existing in aluminum strands surrounding the steel core
12:52 25 both in the field side phase and the center phase, those

STENO

12:52 1 fractures, in your opinion, were caused by wind induced
12:52 2 vibrations in both conductors?

12:52 3 A. Yeah. Anything that causes fatigue. So wind
12:52 4 induced vibrations, it will be thermal expansion,
12:53 5 contraction, it will be galloping, it will be swinging,
12:53 6 it will be what they call dancing up the conductors, all
12:53 7 of that will create unlimited vibrations and those will
12:53 8 cause fatigue, because the stresses will be increased and
12:53 9 decreased ultimately which cause fatigue.

12:53 10 Q. And are you of the opinion that the fatigue you
12:53 11 opine existed in the field side and center phase
12:53 12 conductors prior to the fire were caused by that laundry
12:53 13 list of items you described?

12:53 14 A. Yes, that is correct.

12:53 15 Q. And are you able to discern which of those
12:53 16 items caused the fatigue in the aluminum strands prior to
12:53 17 the fire?

12:53 18 A. You cannot identify individually. It's a
12:53 19 cumulative effect.

12:53 20 Q. Over what period of time?

12:53 21 A. Over long period of time, months and years.

12:54 22 Q. Anywhere from a few months to several years?

12:54 23 A. Correct.

12:54 24 Q. And then your opinion that including dampeners
12:54 25 along the span between pole one and pole two, is it your

STENO

12:54 1 opinion that it would have reduced the vibration that
12:54 2 results in the fractures you testified about?

12:54 3 A. It will reduce. Anything that will reduce the
12:54 4 stress will reduce that problem of fatigue.

12:54 5 Q. All right. Have you performed any testing of
12:54 6 your own to determine how much the dampeners would reduce
12:55 7 vibration in the conductor, such as the one that you
12:55 8 reviewed in this case, how much would that actually
12:55 9 reduce the vibration?

12:55 10 A. No, sir.

12:55 11 Q. Have you reviewed any studies in that regard,
12:55 12 peer review studies?

12:55 13 A. There are papers published. I haven't reviewed
12:55 14 it for this case, but I'm sure they are in my library
12:55 15 somewhere.

12:55 16 Q. And do you have any particular dampeners in
12:55 17 mind, a make or model number, that you believe are
12:55 18 specific to the subject conductor along a 300-foot span
12:55 19 that should have been used?

12:55 20 A. No, sir. That's not my area of expertise.

12:55 21 Q. Same question as to spacers?

12:55 22 A. Same answer.

12:56 23 Q. All right. Have we gone over all your primary
12:56 24 opinions that you intend to express at the time of trial?

12:56 25 A. Yes, I believe we have gone through all of
STENO

12:56 1 them, yes.

12:56 2 Q. Are there any other primary opinions,
12:56 3 Dr. Kumar, that we haven't covered? And there may very
12:56 4 well be in this long Power Point that you produced as
12:56 5 part of your file, but I just wanted to give you an
12:56 6 opportunity to add any more to the list of primary
12:56 7 opinions we attached as Exhibit 3?

12:56 8 A. I think this is a good list of primary
12:56 9 opinions. There are a lot of sub-opinions which are
12:56 10 within the Power Point.

12:56 11 MR. MIJANOVIC: All right. Let's take a short
12:56 12 break and let me just check my notes, and I think we are
12:57 13 going to be done. Five minutes?

12:57 14 MR. BRISCO: Yeah.

12:57 15 MR. MIJANOVIC: Thank you.

12:57 16 THE VIDEOGRAPHER: The time is 12:56 p.m. We
12:57 17 are off the record.

13:04 18 (A recess was taken.)

13:04 19 THE VIDEOGRAPHER: The time is 1:04 p.m. We
13:04 20 are back on the record.

13:04 21 BY MR. MIJANOVIC:

13:04 22 Q. Give me one second, Dr. Kumar. I closed out
13:04 23 that Power Point and I had one other question.

13:04 24 A. Sure.

13:06 25 Q. I'll show you Slide 186.

STENO

13:06 1 A. Okay.

13:06 2 Q. Do you see it on the screen?

13:06 3 A. Yes, sir.

13:06 4 Q. Are these, Item 1 and Item 2, is this where

13:06 5 they mated?

13:06 6 A. That would have mated at some point in time

13:06 7 before the failure, yes.

13:06 8 Q. Okay. Is this the steel core?

13:06 9 A. That is correct.

13:06 10 Q. And as I recall earlier you testifying about

13:07 11 the separation being due to tensile necking where Item 1

13:07 12 and Item 2 mated; is that accurate?

13:07 13 A. That is correct.

13:07 14 Q. And is this the same two ends that you

13:07 15 indicated previously that there was evidence of tensile

13:07 16 necking?

13:07 17 A. Correct.

13:07 18 Q. But on the description on each one of these,

13:07 19 what do you call these? What kind of photos are these?

13:07 20 A. These are optical micrographs.

13:07 21 Q. So the micrographs on the left side you

13:07 22 indicate arced end of steel core, do you see that?

13:07 23 A. Yes.

13:07 24 Q. I thought I asked you earlier where there was

13:08 25 evidence of tensile necking, I asked you if there was

STENO

13:08 1 evidence of arcing at that location, and I thought you
13:08 2 said no?

13:08 3 A. No. No.

13:08 4 MR. BRISCO: Misstates prior testimony.

13:08 5 You can answer.

13:08 6 THE WITNESS: No. There's arcing on both ends,
13:08 7 and I don't believe I testified that there was no arcing.

13:08 8 BY MR. MIJANOVIC:

13:08 9 Q. Okay. So are you of the opinion that the
13:08 10 center core separated due to tensile necking or was it
13:08 11 arcing or was it both?

13:08 12 A. Both. First it goes through tensile necking
13:08 13 and then arcing by separation arc.

13:08 14 Q. So is it true that Slide 186, this is evidence
13:08 15 of separation arcing?

13:08 16 A. Separation arcing at the tip. And you can see
13:08 17 the tensile necking a little bit. On both sides you can
13:08 18 see that the surface, especially at the bottom line, you
13:08 19 can see a little rotation near the fractured surface.
13:09 20 Same thing on the left side.

13:09 21 Now, we have pictures of these before they were
13:09 22 cross-sectioned also, and they both show tensile necking,
13:09 23 and I think we went through each one of them.

13:09 24 Q. Okay. So is it accurate that what's depicted
13:09 25 in Slide 186 there's no evidence in either one of these

STENO

13:09 1 micrographs of core separation due to arcing from an
13:09 2 adjacent energized line?

13:09 3 A. That is correct. Yeah.

13:09 4 First of all, keep in mind that the center core
13:09 5 is surrounded by seven conductors. So the conductors
13:09 6 need to be severed first before anything else happens to
13:09 7 the center core, as far as line arcing is concerned with
13:10 8 another line.

13:10 9 Q. Okay. Sir, have we now talked about all the
13:10 10 opinions you intend to express at the time of trial, with
13:10 11 the exception of rebuttal opinions and possibly
13:10 12 sub-opinions related to your primary opinions?

13:10 13 A. That is correct.

13:10 14 Q. Okay. I don't have any other questions. Thank
13:10 15 you very much, Dr. Kumar.

13:10 16 A. Thank you very much.

13:10 17 MR. BRISCO: Thank you, Dr. Kumar, for your
13:10 18 time. No questions on our end.

13:10 19 MR. SIMON: Do we want to just put the amount
13:10 20 of money you're going to pay?

13:10 21 MR. BRISCO: If we can get the time on the
13:11 22 record.

13:11 23 THE VIDEOGRAPHER: Hold on one second.

13:11 24 MR. SIMON: What time did we start? Let's just
13:11 25 deduct the 30-minute lunch. What time did we start, like
STENO

13:11 1 9:00?

13:11 2 MR. MIJANOVIC: 9 o'clock.

13:11 3 MR. SIMON: Let's say, 9:10 to 1:10, less a
13:11 4 half hour.

13:11 5 And what's the hourly rate, Doctor?

13:11 6 THE WITNESS: It's 525 per hour.

13:11 7 MR. MIJANOVIC: I have three and a half hours
13:11 8 times 525.

13:11 9 MR. SIMON: Dr. Kumar, could you prepare a bill
13:11 10 with a W-9 and send it to David so that he can send it to
13:11 11 Krsto so that we can make sure Liberty pays you?

13:11 12 THE WITNESS: Okay. I'll have my office do
13:11 13 that.

13:11 14 MR. BRISCO: Thank you, Dr. Kumar.

13:11 15 We can conclude the deposition now, and we'll
13:11 16 have a housekeeping matters to handle on our end.

13:11 17 THE WITNESS: So I can sign off then?

13:12 18 MR. MIJANOVIC: Yes, sir.

13:12 19 MR. SIMON: Let's have a reading. Let's do the
13:12 20 reading off the record.

13:12 21 THE WITNESS: Sure.

13:12 22 THE VIDEOGRAPHER: Okay. Before we go off the
13:12 23 record, Madame Court Reporter, do you need anything?

13:12 24 THE REPORTER: No.

13:12 25 THE VIDEOGRAPHER: Okay. This ends Volume I of
STENO

13:12 1 the deposition of Arun Kumar, PhD. The time is 1:11 p.m.

13:12 2 We are off the record.

3 (Deposition concluded at 1:11 p.m.)

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

STENO

Declaration Under Penalty of Perjury

I, ARUN KUMAR, the witness herein, declare under penalty of perjury that I have read the foregoing in its entirety; and that the testimony contained therein, as corrected by me, is a true and accurate transcription of my testimony elicited at said time and place.

Executed this _____ day of _____ 20__

At _____, _____
City State

ARUN KUMAR

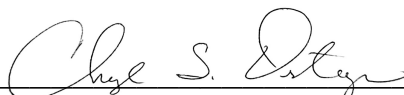
STENO

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

I, CHERYL ORTEGA, Certified Shorthand Reporter for the
State of California, do hereby certify:

That the proceeding was taken by me in machine shorthand
and later transcribed into typewriting, under my
direction, and that the foregoing contains a true record
of the testimony of the witness.

Dated: This 14th of February, 2024 at San Bernardino,
California.


Cheryl Ortega
CSR NO. 13709

ERRATA SHEET
CHANGES IN TESTIMONY
MOUNTAIN VIEW FIRE CASES
ARUN KUMAR, PH.D.
February 14, 2024

Page	Line	From	To
------	------	------	----

1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

SIGNATURE: _____ DATE: _____

ARUN KUMAR, PH.D.

Exhibits	11:19 58:4	2021 21:20,24 22:12	58 64:15,16 65:20
Exhibit 028-0001 6:8 13:14	12 40:22,24 44:22 46:6 53:24,25 54:6,15,17 69:9,23 70:18	2024 7:1,10	6
Exhibit 028-0002 6:9 14:4	122 57:2,8	203 72:20,21	69 54:25
Exhibit 028-0003 6:10 16:16	12:00 75:25	204 72:25	7
Exhibit 028-0004 6:11 30:9	12:30 75:22	205 73:2	71 18:13
-	12:34 76:3	206 77:21,24,25 78:8,24 79:23 80:11	8
-000- 7:3	12:56 88:16	207 77:21	8 14:13 21:20,24 22:12
0	13 41:5 53:24	21 39:9,10 73:18 74:12, 25	9
028-0001 13:14	133 18:8 28:17	25 28:18,22 39:21 40:11,14,20 42:3 43:20 44:8,16,21 45:23 46:1, 10 62:22 71:22,24	9 92:2
028-0002 14:4	14 7:1,10 41:9	26-feet 65:23	9:00 92:1
028-0003 16:16	15 41:13,15,21 42:16	26-foot 72:9 73:5,14 78:3	9:10 92:3
028-0004 30:9	150 57:14	28-0004 29:12	9:19 7:2,10
1	16 42:6,19	3	A
1 13:10 36:23 55:2,4,22 56:6,12,14 64:21 65:2, 20 66:13,21 89:4,11	163 30:1,5	3 16:11 18:2 45:8,25 47:10 56:3 58:10 65:20, 22 71:6 72:7 73:16 78:13 82:12 88:7	a.m. 7:2,11 33:9,12 58:4
103 30:5,6 31:20 32:10 33:16	168 55:15,18 56:2	3-4 39:17 41:1	ability 50:14,15 51:8
104 69:6 70:9	17 22:9,11 42:12 46:25 47:2 73:25 77:13 78:15 79:4	30 75:12,14	absence 20:19
105 56:14,15	18 42:18,19	30-minute 91:25	Absolutely 40:22
108 68:19,22,23 70:10, 13	186 88:25 90:14,25	300-foot 87:18	access 17:24
10:00 33:9	19 42:24 43:2,4,6 78:6	4	accurate 61:15 79:23, 24 83:21,22 89:12 90:24
10:15 33:12	196 72:6	4 28:15 30:7 33:17 34:20 45:18,20 55:20 65:21	ACR 18:13
11 78:6	1:04 88:19	40 83:12	ACSR 47:13 53:14
111 34:8,16,17,20,25 35:2,18 37:4,25	1:10 92:3	5	action 7:7
112 34:24 35:16,17	1:11 93:1,3	50 40:9	activity 61:11,14 62:4
11:07 57:22	2 13:23 14:6,12 40:4 55:3,9 56:6,12 57:9,10, 15 64:21 65:2,20 66:13, 21 79:14 89:4,12	500 31:1 35:12	actual 19:9 37:20 38:23 39:14 44:25 48:25 49:1, 20
11:08 58:1	20 43:3,10,16 44:23 46:6 78:6	5228 7:16	add 68:15 88:6
11:17 57:24	20-foot 78:7,13,14	525 92:6,8	added 12:24 75:3
	200 13:1 15:9 38:22		additional 75:1
	202 72:15,19		adjacent 79:9 91:2
	2020 22:9,11 46:25 47:2 74:1 77:13 78:16 79:4		

age 21:1 38:11	73:18 74:12	aware 27:16 52:4	Brisco 7:25 8:1 11:5,22
aged 81:15,20	arc 18:15 20:1,6 25:22	awhile 17:4	16:22 17:8,17,19,23
ahead 42:5,13,21 70:16	41:18 42:8,10 43:7		24:21 26:4 33:4,7 38:14
84:8	47:17 55:24 58:21		57:25 68:15 70:15,25
air 64:13 73:10	66:12,19 70:13 74:20,	B	75:14,24 78:18 84:1
Alex 8:5	23 78:14,25 79:2,12,22		88:14 90:4 91:17,21
aligned 66:4	80:2,10 81:21 90:13		92:14
aligning 65:19	arced 25:21 35:25	back 25:24 30:25 32:5	broad 15:23
alternating 24:2	58:14 71:7,16 72:12,23	33:13 40:16 43:4 47:10,	broken 72:10,22 73:3,7
aluminum 18:12,13,19,	73:3 80:15 81:1 89:22	24 57:23 58:5,7,10	brown 58:16 62:11,12,
24 20:18,21 21:9 27:6,	arcing 20:13 36:6,18,	60:11,19 61:12 62:9	14,17
18,23 28:10,18 29:5	25 37:5,8,18 41:11,12	66:1,6 73:1 75:22 76:4,	browned 57:16
31:10,13,21,22 35:1,23	43:1 44:13 46:13 48:15	6 84:19 88:20	brownish 63:15
36:10,14 37:4,10,14	50:8 58:15 59:8,9,15	badly 57:10	brush 59:3,9
39:1,7,12,18,22 40:2,	61:7,8,9,16,17,19,24	balance 19:2 20:23	Budd 9:3
11,20,25 41:5,6,11,14,	62:10,14 63:2,16 64:24	40:1 55:6	Buhlert 7:6
17 42:7,14,22,25 43:6	65:24 66:4,6,16 71:12	Baron 9:3	build 26:14 27:2,5
44:8,21 45:11 46:2,11,	73:17,19 74:12,24 75:7	base 74:19	bullet 45:21,22 46:1,9
12 47:12,25 48:1,5,19,	77:3,6 78:12 79:20,25	based 12:23 14:25 16:1	58:12 61:22 62:9,22
22,24 49:2,5,7,13 50:4,	81:13 82:11 90:1,6,7,	21:2 24:14 58:24 59:2	63:20 71:5
5,7,13,24 51:2,3,16,18	11,13,15,16 91:1,7	61:11 66:11 70:1 81:20	
53:1,5,9,11,14,17,21	arcs 44:14 59:14,16	82:19 83:23 84:21	C
54:1,15,17 55:4,6,23,25	area 12:15 14:17 23:13	basically 59:8 62:16	caging 43:8,12 48:24
56:16,18 62:23 63:1	32:24 38:8 39:13,14,25	basis 12:12 84:11	Caine 9:19,20
68:25 69:14,15 71:8,16,	40:5 41:7 48:6 53:10,18	Bauman 9:14	Cal-fire 59:1
23 72:3,10,16 85:24	54:7 56:7 57:6 59:3	behalf 7:23 8:6,22 9:1,	calculate 52:20
86:16	61:9 62:18 63:22 64:2,	11,15,21,24	calculations 51:23
aluminums 55:23	73:4 74:25 78:20 83:20	bent 42:23	52:7 53:12
Amanda 8:8	87:20	Berger 8:15	California 7:15
ambiguous 60:7 65:9	areas 14:15 70:9	bill 10:1 92:9	call 19:19 27:11 30:15
68:16 78:18 84:12	Arun 7:17 10:7 93:1	bird 43:8,12 48:24	52:8 86:6 89:19
amount 21:8 22:23	associate 40:20 74:13	bit 14:8 30:11 39:19	called 14:14 15:18 20:6
33:20 52:14,23,25	assume 52:23	43:8 90:17	25:21
82:21 83:2,3 91:19	assuming 59:19	bits 80:16	capability 36:25
analysis 31:14,15 34:7,	attach 13:9 16:8,20	black 41:11 42:8,25	capture 47:5
10,24 35:15,21 37:24	attached 16:11 79:18,	43:7 55:8,9	career 27:8
38:19,25 43:24	21 88:7	blackening 72:24	carefully 85:5
Angeles 7:15	attaching 11:8 13:23	blackish 63:14	case 7:13,15 14:1 87:8,
angle 34:3	attacking 21:9	BLM 21:19,22 22:2,12,	14
angled 19:21 71:10	attempt 64:10	24 32:3 44:4 55:20,21	cases 7:14 10:17 20:7
anymore 51:5	attention 71:1,3	64:11,19,21 65:23	83:14
appearing 12:5	attorney 7:18,20	73:14 78:4 81:6	
appended 16:2	attorneys 7:9,20	bottom 56:17 64:25	
approximate 28:22	11:16,23	90:18	
approximately 64:20	Audrey 8:11	break 17:1 33:1 57:23	
		58:7 88:12	

Casetta 9:10,11	combination 19:3	23,25 64:23,24,25 65:3	47:14,16,18,22,25 48:2,
categories 12:14	combine 19:16 20:10	66:7,17,20 67:2,4,7,15,	3,4,13,23 49:15,21,25
categorizing 39:2 84:3	40:9 82:23	24 68:11 70:12 71:17,	50:4,10,19 51:8,13,25
caught 80:16	combined 39:21	20,25 72:8,10,23 73:1,	52:15,16,18,24 53:7,8,
causation 14:15 58:23	combustibles 62:18	8,9,12,16,21 74:11	14,15 54:7,9,12,13 55:7
caused 23:8 42:10	common 22:20	76:13,18,20 77:20 78:2,	56:9,10,11 57:8,18,19
58:23 62:13 63:7 79:22	communications	8,15 79:9,21,25 80:6,9,	85:24 89:8,22 90:10
85:19 86:1,12,16	11:16	14,25 81:4,13,16 82:4,	91:1,4,7
causing 24:8 49:16	compared 23:3 27:11	8,21 83:1 85:19 87:7,18	correct 10:21,22 11:3
center 24:17 36:5 40:6	40:1 82:25	conductors 20:18	14:19 16:15 17:7 18:17
47:25 48:2 56:19 63:21	competent 59:19	21:17,23 22:3,18,25	19:10,11 22:9,10,18,19
64:1,6,24 65:3 66:7,12,	compilation 43:19	24:10,11 26:9,10 27:7	23:1,11,17,24 24:18,20
17,20 67:1,7,15 70:1,4,	complete 13:16	32:11,23 39:18,22,25	25:3 26:22,23 28:5,25
7,8,12 71:9,16,18,19,25	completely 49:4	40:25 41:10,14,17,21	32:12 34:21,22 35:3,4,
72:4,8,23 73:8,11	composition 35:22	42:1,7,14,23,25 43:6	7,8,19 37:6,7,11,17
76:17,22 77:1,12,20	compromising 51:8	44:5,8 45:23 51:21 55:7	38:13,15 44:12 46:6
78:2,5,7,9,13,15 79:12	computer 17:11	63:22 64:12 71:9 73:3	47:2 48:21 49:22 53:7
80:10 81:11,20 82:7	concentrate 51:18	75:9 76:17,22 77:2 78:5	56:4 59:21 61:19,21
85:25 86:11 90:10 91:4,	concentrating 53:10	81:11,15,20 82:14,23	62:7,8,21 67:10 68:12
7	concerned 83:5 91:7	85:16 86:2,6,12 91:5	73:9 74:18 76:24 77:14
certainty 26:2 80:9	conclude 20:20 92:15	conductors' 82:14	78:10,11,17 81:23
chance 13:12,25	concluded 23:6 93:3	confirm 30:3 52:10	86:14,23 89:9,13,17
change 76:9	concluding 23:13	Connect 7:13	91:3,13
check 88:12	conclusion 19:16	connected 39:15	correlate 74:20
chemical 35:21	31:23 81:19	55:20,22 56:12 57:8	correspond 66:12,20
Cheri 10:4 43:11 80:18	condition 32:20 34:2	79:15	70:11
chimes 47:8	conditions 27:15 28:7	connection 15:6	corroded 15:16
chloride 31:13	82:22	consensus 66:3	corrosion 36:6
chronological 13:5	conduct 14:23 49:14	consistent 66:8 73:19	County 7:15
clarification 61:3	50:15	75:8 79:12,14 80:13,24	coupled 23:17 31:21
63:13	conducting 51:21	81:3	court 7:14 10:4 47:5
clarify 12:17 78:21	conductor 18:7,13	contact 59:20 61:5,6,	84:18 92:23
clause 47:15	19:10 20:2,24 23:2	14 74:13,16 75:5 79:11	covered 45:17 50:5
clean 32:22	24:13,14,17 25:22	80:10	62:23 63:12 88:3
close 20:4 28:18 69:4	26:15,25 27:6 28:19	contacted 79:9 80:14	Cozen 8:1,19,25
75:4	32:18 34:1 38:25 39:12,	81:1	crack 21:5 23:14
closed 88:22	15 40:7,11,20 43:17	contained 71:20	cracked 18:19,23,25
coated 36:5	44:22 46:3,14,18,23	continue 28:13 81:7	19:6 25:18 28:10 45:10
coating 36:16 37:9	47:13 48:5,9,18 49:11	continues 20:24	47:12 72:16
collected 15:6	50:24 51:1,2 52:21	contract 76:13	cracking 19:7,8
collectively 10:20	58:17,23 59:4,5,14,23	contracted 7:6	cracks 18:12 19:11,13,
	60:15 61:4,5,13,23	contraction 86:5	17,18,25 20:22 21:2,16
	62:5,12,15,18,19 63:3,	contributing 65:19	22:14 24:5,24 28:12
		control 32:3	Craig 8:15 12:12 60:5
		core 18:14 36:4,17	68:6 84:11
		37:6,9,10,19 45:12	create 38:7 59:9,16
			86:7

created 32:6 74:24	17 65:20 78:8 79:23 80:11 90:24	discussing 33:15 45:18	10,23 35:15,21 37:24 38:19 43:24
creates 48:15		discussion 65:19	effect 86:19
creating 58:15,21	depicting 70:9 78:25	dispersive 31:8	effects 84:7
cross-sectioned 90:22	depiction 55:15	display 17:5 30:3	electrical 61:11,13 62:4 83:13
cumulative 86:19	depo 7:24	displayed 29:13	electrically 25:21
cut 18:9 56:17 65:25 72:9 73:14 78:4 80:16 82:6	depos 43:14	displaying 30:6	electricity 20:5 48:3,15 50:15 53:9 59:6
D			
damage 20:14 41:12 58:15 61:25 62:10 73:17 74:11	describing 45:13 48:18 49:9,13 52:6,7 71:15	document 11:6,9,15 12:9 13:12	electron 18:23 19:1 30:16 32:20 44:5 45:1,3 56:23 57:11
dampeners 82:13 83:9 84:16 86:24 87:6,16	description 89:18	documented 40:13	electronic 30:25
Dana 8:19	designation 15:17,23	documents 13:11 15:19	elements 35:22
dancing 86:6	designed 50:19	downed 58:17,22 62:4, 11 79:3	elevated 48:13
dark 46:13 63:1,5,6	detail 45:1,3 56:21 63:18 73:13	draft 11:14	eliminate 82:15
darker 27:10	detailed 57:5	drop 73:20 74:7 76:14	eliminated 83:9
date 21:1,10 24:19 25:12 27:17 38:10 42:1, 3 47:1 79:7,8	details 34:4	dry 59:3,9	employee 7:8
dates 26:16	determination 19:12 65:6,10,13	ductile 48:8,12 49:5	employees 15:20
David 8:1 70:23 92:10	determine 87:6	due 44:11 46:13 49:10, 12,25 50:1,2,8,11 53:19 54:7,13 61:14 63:2 71:9,20,23 77:3,6,12 81:13 82:21 89:11 90:10 91:1	end 17:10 36:21 39:17 40:13 41:18,22 46:3 49:3,8 51:15 54:2 55:3, 8,9,24 57:5,15,17 58:13,16 59:5,6,14,15, 23 60:8,10,15,17,25 61:1,23,24 62:10 69:8, 9,11,12,17,18 70:11,18, 19 72:10,24 73:18 75:1, 10 78:6 82:10 89:22 91:18 92:16
day 25:3 38:3 39:3 44:4	determining 18:20	duly 10:8	ends 20:4,8 25:20 46:12 49:5 54:19 55:20 56:11 63:1 64:21 67:4 69:13,22,24 71:8,16 72:11 73:3 89:14 90:6 92:25
deal 17:10	detour 16:17		
decision 65:1 66:9,11	differentiate 80:5	E	
decreased 86:9	difficult 21:10 82:25		
deduct 91:25	direct 29:2,3	e-mail 11:5	
Defendant 7:23 9:24	direction 53:2	EAG 44:5	
defending 7:24	discern 86:15	earbuds 33:2	energize 36:22
degree 26:1 80:8	disclosed 14:1	earlier 12:23 25:17 63:13 71:22 78:19 81:22 85:23 89:10,24	energized 20:2 25:22 41:12 42:9 46:15,19,23 49:11 58:13,22 59:5,7, 13 63:3 77:10 79:9,11, 19 80:4 91:2
depend 27:8	disclosure 13:24 14:2 15:2,3	east 18:10 36:23 39:24 54:16,18 61:24 62:4 64:22 69:17 79:21	energy 31:8 36:21 37:1 49:15 50:15,24,25 51:19 52:14 59:18 79:16,20
depending 19:22	discoloration 46:13 58:16 62:11,12,14,17 63:2,6,14	easy 12:2 54:20	
depends 21:8 22:17 27:15	discolored 57:16	EDS 31:14,15,17 34:6,	
depict 29:4	discuss 27:16 52:4		
depicted 15:12 31:6,20 32:15 33:16,22 34:20 35:1,2,18 37:4 54:6,15,	discussed 71:14		

engineering 85:13	exception 11:1 91:11	fails 49:8	Figure 55:5,15
engineers 83:13	exerted 53:13	failure 18:11,18 19:7 21:12 25:23 26:10 28:19 31:24 32:24 34:3 36:24 39:13,14 40:25 41:7 45:1,10 46:15,19, 24 47:11 49:5 50:8 53:22 58:12 60:3,4 61:22 62:6 63:4,22 64:3,4 66:7 70:7 73:20 78:20 89:7	file 13:16,19 15:9 17:3 29:3 34:12 38:23 40:13, 21 88:5
enlarge 14:8 30:11	exhibit 11:8 13:10,14, 23 14:4,6,12 16:11,16, 21 18:2 29:12 30:7,9 33:17 34:20 44:9 45:8, 25 47:10 56:3 58:10 65:21 71:6 73:16 82:12 88:7	failures 40:6 46:14 63:3	filed 7:14
entire 22:20 28:16 48:9, 10 60:19 61:1,9 84:3	existed 19:13 25:25 28:23 33:23 35:2 74:1,3 86:11	fashion 64:7	final 18:14 19:16 20:24 24:25 45:11 46:15,19, 24 47:13,16 48:14 53:22 63:4
entitled 11:7	existing 19:14 85:24	fatigue 19:7,17,18,22, 23 20:15 21:4,16 23:19, 23,25 24:2,4,8,13,15, 19,24 25:2,8,10,19,20, 25 26:2 28:10,25 30:19 31:25 32:13 38:2,3,5,6, 11 39:4 42:9 44:9,11, 12,14,23 45:10 46:14 63:2 71:9,10,20 82:15, 20 83:4 84:15 85:7,10 86:3,8,9,10,16 87:4	finalized 13:8
Entity 9:4	expansion 86:4	fatigued 18:12,19 47:12 49:7	financially 7:7
environment 21:8 22:17 23:8	experience 83:17,18	fatiguing 20:21	find 20:17 67:5 68:1 72:4 78:1
environmental 27:15 28:7 32:2	experienced 24:13	February 7:1,10	finding 15:5
envisioning 54:13	expert 10:16 13:24 14:14,20 15:3	feedback 47:4	fine 10:14 16:10 63:12 75:20
equal 22:23	expertise 14:15,17 27:4 83:19 85:8 87:20	feet 18:8 28:16,17,18, 21 39:22 40:12 41:9 42:11,16 43:17 46:2 73:18 74:12,25 78:6	finished 11:13
equipment 82:13 85:5, 8,9	experts 16:2 64:10 83:19,24 84:5,22	fell 58:14,21 59:4 61:4 72:14	fire 10:16 11:7 15:7,22 21:6,17 22:8 23:14 24:15,20,25 25:11,15, 25 26:3 27:25 28:12 29:6 30:20 31:20 33:24 35:3 36:15 37:16,23 38:12 39:3,5,7 41:23, 24,25 46:21 58:15,21, 23 59:9,16,18 62:16 63:7 64:9 71:24 72:3 73:8 74:2,4,6,8 76:23 77:7,8 83:14 86:12,17
equivalent 35:13	explain 18:20 23:15 24:1 30:18	field 18:7 19:9 24:12 25:10 28:19,23 33:23 38:25 44:4 50:11 52:21 53:18 54:2,3 59:22 60:15 63:21,23,25 64:6 67:2,4,8,12,16,17,18,24 68:11,18 69:10 70:1 71:8,18 72:1 73:16 74:10,14,15,21,24 76:13,16,22 77:1,11 79:10,11,17 80:3,13,25 81:4,6,11,19 82:8 85:18,20,25 86:11	flame 62:19
essence 23:12 27:17	exposed 23:8		flat 19:21 30:23 71:10
estimate 25:9,13,14 26:13,18 39:6	express 10:23,24 12:7 87:24 91:10		focus 30:17
Evan 8:16	expressed 11:19 76:9		focusing 39:7 45:9,25
event 37:5 46:20 78:16 79:13	expressing 12:6		folks 16:23
eventually 31:16 44:4 49:8	F		footprint 19:19
evidence 15:6 33:21 56:5 62:17 63:21,25 64:3 65:9 67:3,7,11,22, 23 69:10 70:4 77:5,7,15 78:2 89:15,25 90:1,14, 25	fact 23:18 32:18 34:7		force 52:20,24 53:6,8, 13
evidenced 71:9 78:12	factors 28:6		forget 12:3,10
exact 12:16 26:6,16 27:14 28:2 74:23	fail 33:2		format 16:20
exam 22:12	failed 18:8 20:4 34:1 37:1 39:13,25 40:2,4, 12,13,25 41:5,10,13,17 42:3,4,8,14,22,24 43:6, 16 46:3,12 49:7 54:1 56:15 58:13,15 60:8,10, 25 61:23,24 62:10 63:1 64:21 67:4 69:8,9,11, 12,13,17,18,22,24 70:11 71:7,9,15,20,23 74:14 75:10		found 20:16 40:2 66:6, 16
examination 10:10 18:23 21:19,21 44:3			fourth 46:1,9 62:22
examine 21:15,17 66:15			Fowler 11:2
examined 19:2 21:14 45:1,3 66:14 67:19 73:13			
examples 38:17			

Fowler's 15:15	Gold 9:16,17	higher 82:21	independent 52:9
Fox 9:5,17,18	good 7:22 8:1,5 9:20,23 10:12,13 43:15 48:5 51:2 57:25 71:3 75:11 82:4 88:8	Hinds 59:2 60:2	indicating 46:13 73:21 74:14 77:11 81:14
fracture 19:21 20:11 23:3,23,25 24:8,15,19, 25 25:2 27:8 30:19,23 31:2,6,20,23,24 32:4,7, 10 33:22 34:3 35:1 36:2,15 37:3,10,14,15, 22 38:2,4,6,7,11 42:9 63:9 71:23 85:7	great 17:22 29:19	historical 83:18	indicators 69:18
fractured 22:20,24 23:5,7,9,18,22 24:7 26:15 27:18,23 28:18 30:22 35:20,21 36:1,8, 14 44:10 46:2,11 53:6, 18 54:14 57:5,17 62:23 72:3 76:18,20 81:12,21 90:19	greater 23:7,9,15 53:6, 8	Hoffman 9:9	individual 8:6,23 19:6 38:22
fractures 23:19 24:2, 13 25:8,10,25 26:3 28:22,23,25 29:4 32:15, 22 38:3 39:1,2,4,6 44:10,15,23 48:25 49:1 71:10,11 76:22 82:5,15, 20 83:4 85:17,18,23 86:1 87:2	Greg 7:6 17:2,13,23 29:10	hold 50:17,22 51:8 81:4 85:16 91:23	individually 86:18
frame 69:14	Grotefeld 9:8	holding 48:9	individuals 11:24
fried 56:16	ground 18:10 19:10 44:18 55:10 58:14,21 59:7,8,24 60:16,20 61:4,5,7,10,14,17,18,25 62:15 64:20 75:3	hot 48:6,7 59:14	induced 85:21 86:1,4
front 40:8	group 66:3,10,22 70:2	hour 33:1 75:19 92:4,6	industry 83:19,24 84:22
fuel 59:19	growth 24:6	hourly 92:5	information 22:2 35:15,24
fully 46:15,18,23 63:3	guys 17:15 75:21	hours 92:7	initial 21:20
G	H	I	initially 24:4
galloping 86:5	H-I-N-D-S 59:2	identified 78:13 81:6	inspect 21:25
gathered 84:5	half 28:16,18 39:22 40:12 46:2 72:11 92:4,7	identify 29:22 86:18	inspection 15:14 82:5
general 85:13	handle 92:16	ignite 59:16,18	instance 45:13
generally 12:1 13:4 26:17,19	handling 72:13	illustrate 14:24	instances 71:23 72:2
Geoff 8:22	handy 21:19	impact 32:16,17	instant 38:3
gigabytes 16:19	Hang 30:4	impinging 62:19	instantly 19:18 29:1 31:25
give 12:6 19:16 24:23 25:9,12,13 26:6,13 29:7 39:21 54:23 70:23 88:5, 22	happen 21:11 23:19 29:1 32:1	inch 41:9 72:11 78:6	intact 52:15
glad 29:17	happened 15:14 21:12 23:20 25:14 67:2 79:5,6	inches 39:19 42:11,17 43:17 54:9,12,14,16 61:8 69:8,9,11,12,15, 23,24 70:18 78:6	intend 10:24 12:7 87:24 91:10
	hard 68:5	incident 22:6,11 31:7 44:17,24 47:19 74:1 77:13	intention 12:8
	hear 80:18	include 15:10 31:16	interested 7:7
	heat 59:16	includes 13:11	interesting 35:24
	heated 50:22	including 86:24	investigated 66:5
	heating 48:4,6 49:10, 12,16 51:3,7,13,20,24	increase 20:23 53:4	investigation 15:6 59:1
	held 83:23 84:22	increased 86:8	involved 28:7
	high 31:10,11,17,18 50:12,13	increasing 53:1,2	involvement 65:18
			issue 16:18 24:9 27:17 32:21
			issues 8:17 15:4
			Item 28:15 36:23 40:4 45:18,20 55:2,3,9,20,21 56:6,12 57:9,10,15 64:21 65:2,20,22 66:13, 21 72:7 78:13 79:14

89:4,11,12	landed 59:24,25 60:16	66:7,16,17 67:3,9 68:17	mark 36:14 55:8,9
itemize 15:10	Landis 9:13,14	69:2 72:7,19 73:2 74:21	74:20,23
itemized 71:7	laundry 86:12	75:9 80:12,23 81:6 90:1	marked 13:14 14:4
itemizes 11:6	Law 9:17	locations 40:7 56:8	16:16 30:9 45:8
items 65:2,7,20 66:11	laying 60:20 62:15	71:21 75:6	marking 65:25
86:13,16	leave 19:18 34:9,25	Loewe 9:14	match 55:24
	left 30:17 33:15 39:14	long 19:24 24:4,5 25:8	mated 89:5,6,12
J	40:4 43:8 51:1,17,19	26:9 27:1,5 29:1 32:1	material 30:24
	55:2,21 56:17,22 57:3	41:25 58:16 62:11	mating 57:15
Jason 9:3	64:22 66:1 69:21,22	65:24 72:11,12 75:17	matter 14:24 32:17
JCCP 7:16	76:12 89:21 90:20	78:3 86:21 88:4	34:7
Jeffrey 59:1	length 18:9 26:14	longer 27:10,12	matters 92:16
Joanna 9:18	28:17 58:16 61:1 62:11	looked 27:7 28:17	Maxwell 9:15
Julius 9:2,3	72:9 84:3	58:25	Maycon 8:24,25 11:22
jump 20:5 43:1 48:16	letter 14:17	Los 7:15	Mcculloch 17:2,13
	level 35:11 51:6,24	Loscutoff 8:9,12 9:25	29:10
K	63:17	10:1	means 20:15 36:1
	levels 28:8	loses 53:14	39:17 61:1 68:18
Kahn 8:15	liability 14:14	lot 12:21 29:20 38:1	meantime 16:7 17:21
keeping 53:3	Liberty 7:23 9:24 15:20	39:11,25 59:3 60:1	measure 30:25
kind 26:10 36:24 89:19	16:2 92:11	67:18 88:9	mechanical 20:14
kindly 54:25	library 87:14	low 36:8	61:25
knowing 80:7	Lilla 9:8	lunch 75:12 76:2,7,10	meeting 11:18,20
knowledge 83:20	lined 64:12 66:15	91:25	melted 41:18,22 68:23
Krell 8:16	lines 44:17 66:2 77:10		73:3
Krsto 7:19,22 17:8,14	83:7 85:12	M	melting 36:7 71:12
29:16 33:4 60:9 68:2	list 11:25 12:8,22 15:24	Madame 84:18 92:23	mentioned 12:23
70:25 75:17 84:13	18:3 45:7 58:10 86:13	made 61:5,6 64:10	25:17
92:11	88:6,8	66:10 74:16 76:13	mess 17:11
Kumar 7:18 10:7,12	listed 18:6	79:11 80:9	metal 15:15 84:7
12:19 14:7,13 16:22	live 59:13	magnification 31:1	metallurgical 10:20
33:15 44:20 58:7 60:23	load 50:17,20,22 51:5,9	35:12	15:1,5 19:20 26:2 66:24
65:18 68:8 75:14 76:6	82:21	main 28:19 35:22 39:13	83:16 85:7
78:24 84:6 88:3,22	loading 48:1 51:17	40:25 41:6	Metallurgically 80:5
91:15,17 92:9,14 93:1	52:25	maintained 22:24 83:6	metallurgist 26:7
Kumar's 29:11	loads 20:23	85:11	59:10 83:11,12,25 84:6,
	localized 63:8	major 12:3,14,20 13:6	14,23 85:4,13
L	locate 40:14 56:5 74:23	20:17	metallurgy 14:18
	located 54:6	make 17:24 19:12 65:6,	Meyers 8:18,19
lab 45:4 66:6,15 72:13	location 30:25 37:5,19	10 71:1 87:17 92:11	micrograph 30:17,18
Laboratories 44:5	39:18 48:20,23 51:3	makes 82:24	32:23 34:4 37:24 57:3
laid 12:13 64:19	54:16 56:6,15 61:18	making 13:8 65:1	
		manner 25:18 48:13	

micrographs 30:16 31:6,7 32:9,14,18 33:16,21,23 34:10,20 35:10,18 38:18 56:11 89:20,21 91:1	moving 60:1		opining 59:12,13
microscope 18:22,23 19:1,2 30:16 32:21 34:2 44:6 45:2,4 56:23 57:11	multiple 18:24,25 19:11,25 26:5 74:24 75:5 76:18,20 77:6,12 81:12	O	opinion 16:13 18:6,16 21:16 22:13,22 24:9,12 26:25 27:1,5 28:11,20, 21,22 30:19 31:19 32:10 35:1,10 36:13 37:3,13,22 38:19 41:22 44:9,21 45:7,9,18 46:1, 5,10,12 47:11 50:10,18 51:23 53:5,17 56:2 58:20 59:17 61:20 62:13,25 63:17 70:3 71:19 73:7,15,25 74:10 76:16,19,25 77:4,5 78:14 79:2 81:4,7,9,22, 24 82:12,19 83:8,16,23 84:2,3,4,5,17,21 85:7, 16,17 86:1,10,24 87:1 90:9
middle 55:5	N	O'CONNOR 8:2,19,25	opinions 10:20,23 11:2,6,7,14,15,17,19,25 12:3,7,8,10,13,20,23 14:14 15:11,24,25 16:12 18:3,4 28:14,15 45:8 58:11 59:11 71:6 76:8 87:24 88:2,7,9 91:10,11,12
Mijanovic 7:19,21,22 10:11 12:18 13:15 14:5 16:17,25 17:15,18,21, 25 18:1 25:1 26:12 29:15,19,24 30:10 32:25 33:6,8,14 38:16 43:22 47:4,9 57:22 58:6 60:22 65:16,17 68:7,20 70:20 71:4 75:11,19,21 76:5 78:21,23 80:18,21 81:2 84:18 85:2 88:11, 15,21 90:8 92:2,7,18	narrow 26:21	object 12:11 65:8 70:24 78:18 84:1	opportunity 70:23 88:6
mind 18:24 36:22 37:19 44:3 75:1 78:3 87:17 91:4	native 16:20	objecting 84:11	opposed 60:10
minute 29:9	nature 28:8 63:15	objection 26:4 60:7 68:16 70:15	optical 18:22 19:2 32:23 34:2 57:12 89:20
minutes 11:4 33:4 75:12,14 88:13	necked 57:6	observation 15:5 19:20 20:12 24:16	options 80:2
mishandling 32:2	necking 18:15 20:17 47:14,17,22 48:12 49:9, 16,19 50:1,2,11 51:25 52:17 53:19 54:8,14 56:21 57:4,17 89:11,16, 25 90:10,12,17,22	observations 13:6 15:1,11 19:15 20:10,19 21:2 25:15 37:22	order 13:5
missed 71:22	neutral 74:16,20	observe 28:11	ordinarily 59:10,11
misstates 65:9 90:4	nice 14:9	observed 23:4 33:21 49:20 85:17	orient 65:2
model 87:17	nonetheless 75:7	observing 23:13 35:11	orientation 67:6
moment 47:5 57:1	notary 7:6	obtained 83:20	oriented 64:7,8 70:2
money 91:20	notes 13:18 88:12	occasions 52:12	origin 32:5 59:11,12
month 27:24	notice 13:10	occur 19:17,24 24:2 31:25 38:3,5,7 39:5 82:20	original 73:5
months 21:6 26:7,11, 19 28:3 35:6 37:17,23 38:12 47:1 86:21,22	November 22:9,11 46:25 47:2 73:25 77:13 78:15 79:4	occurred 18:11,18 21:5 22:6,8,11,12 24:15,19,24 25:2,10 27:25 28:1 32:4,10,16 36:15 37:15,20 38:12 41:23 42:2,10 45:10,12, 14 46:14 47:11 51:14 61:19 63:3 66:25 79:3, 4,25 80:3	Ortega 10:4
morning 7:22 8:1,5 9:20,23 10:12,13 11:13 15:24 16:13	nucleates 24:5	occurring 36:2 46:20 49:10	oscillation 83:2
Mountain 7:13 10:16 11:7 15:7,22 24:25 25:15	nucleation 24:6	occurs 20:1,3,7,9 25:22 26:11 31:23,25 38:4 50:3	outer 23:5 50:3,6
move 9:6 82:24	number 7:15 14:13 18:7,8,10 22:12 25:17 27:14 28:2,15 30:1 36:23 37:2 39:9,16 40:4,8,22,24 41:5,9,13 42:12,16,24 43:16 45:18,20,22 46:3 54:25 55:2,3,4,9,18,20,21,22 56:14 57:2,9,10,14,15 58:14 61:23 64:15,21 65:20,22 66:13 67:19, 23 68:12,19 69:6 70:10 72:6,7,15 75:3,4 77:21 79:14,15,18 87:17	offer 14:14	overhead 24:10 26:10
movement 24:10,14 32:11 82:21	numbers 40:20 53:24	office 21:20 92:12	oxidation 20:9 21:7,13 22:15,19,23 23:4,7,9, 13,16 26:14,25 27:2,5,
	numerous 77:3 81:13	one-page 11:6,15 12:9 16:12 45:7	
		open 62:19	
		opine 15:18 33:22 58:12,20 86:11	
		opined 76:12	

9,10,17,23 31:23 32:5,7 33:20 34:6,22 35:11,14 44:12 71:11	penultimate 81:9	21 10:2 14:2	prepared 10:23 15:8, 24 16:13 18:3
oxide 31:13,15,22 36:10,11	people 11:21 64:12 65:25	plaintiffs' 11:16 13:24	presence 20:20 36:13
oxidized 20:9 23:2 25:20 27:21 29:4 30:21, 24 31:3 57:10	Perfect 14:11	platform 17:1,5 29:14	present 26:3 27:17,24
oxygen 21:8 31:10,12, 18,19,21 35:23	performed 53:12 87:5	point 12:25 13:1,3,7 15:8,14 16:4,19 19:4 21:18 25:16 29:2,11 31:16 34:7,8,13,14 36:7 38:21 39:15 45:5,14,21, 22 46:1,9 47:1 48:17 49:20 50:8 51:14 54:2,4 55:23 58:12 60:19 61:22 62:9,22 63:20 64:11 66:13,21 67:1,8, 12,24 69:2 70:14 71:5 75:12 77:17 88:4,10,23 89:6	presentation 67:20
P	period 19:24 20:9 22:13 24:4,5 25:8 26:9 27:12 32:1 38:4 39:5 82:22 85:22 86:20,21	pole 18:7,8,10 36:24 37:1 39:15,24 46:3 55:21 58:13 60:9 61:23 67:19,22 68:11 73:19 75:3,4,6 76:17 77:2 79:15,18,22 81:12 86:25	presuming 68:17
p.m. 75:25 76:3 88:16, 19 93:1,3	peripheral 83:16	portion 58:22 84:4	pretty 32:22
Pacific 7:11	pertaining 15:5	position 64:20	prevention 36:6
package 59:19	phase 19:9 25:10 28:23 33:23 50:11 53:18 54:2, 3 59:8 64:1,6,7 66:12 67:8,12,16 68:18 69:11 70:1,2,5,7,9 72:4 74:14, 16,22 77:11,12 78:9,13 79:10,11,12,17 80:3,4, 10 81:20 85:18,20,25 86:11	possession 21:23 22:4,25	previous 35:13 65:10
papers 87:13	phases 82:24	possibility 66:23	previously 89:15
paragraph 14:12 71:15	Phd 7:18 93:1	possibly 91:11	primary 18:16 87:23 88:2,6,8 91:12
paralegal 8:16	photograph 15:12 53:20 56:19,22 57:3 69:7,20	Power 12:25 13:1,3,7 15:8,13 16:4,19 19:3 21:18 25:16 29:2,11 31:16 34:7,8,13 38:21 45:5 64:11 77:17 88:4, 10,23	print 16:3
paraphrase 36:12	photographs 13:21 15:10,19 19:4,5 30:15 43:21 45:4 54:11 56:10 58:25 59:2 67:20,21 78:1,24	predate 44:23 77:7	printing 16:9
parentheses 18:9	photos 32:21 40:21 57:12 77:15 89:19	predated 21:16 28:12 29:5 30:19 31:7,20 37:15,16,18,23 39:6 71:24 72:3 73:8 76:23 77:9,13	prior 18:11,19 19:7,13 21:6 24:15 25:11 26:3 32:4 33:24 36:15 38:12 41:23 45:10 46:15,19, 23 47:1,11 52:24 63:4 64:8 73:21,24 74:1 82:4 86:12,16 90:4
part 13:19 29:3 46:9 47:18 58:20 60:20 76:9, 25 79:18 88:5	phrase 85:16	predates 31:24	problem 87:4
participate 64:5 65:1, 3,11	pictures 90:21	preexisted 39:3,4	proceed 10:4 58:8
participated 70:3	piece 78:8,14	prefire 79:5,6,7	process 20:24 32:7,13 47:24 65:4
particles 31:4	pieces 80:16	preparation 13:4	produced 13:19,21 15:9 21:24 88:4
parties 7:9 15:21 21:24 70:2	pinpoint 63:10	prepare 11:9,11,25 13:4 92:9	Production 13:11
parting 41:18 42:10 44:14	place 15:15 21:1 24:18 27:9 48:12 75:5		progressively 18:12, 19 20:21 45:10 47:12
parts 84:7	placements 64:6		properly 66:22
party 15:21	placing 27:17		provide 10:20 27:4 59:10,11
Paul 9:11,14	plaintiff 10:19 11:23		provided 15:20
pay 91:20	plaintiffs 8:2,6,9,12,16, 20,23 9:1,4,9,12,15,18,		public 7:6 9:4
paying 71:1,2			published 87:13
pays 92:11			pull 30:2 54:25
PDF 16:3,9 17:14			pulled 38:23
peak 31:10,12,18,19			pulling 48:9,11
peer 87:12			purview 83:10
			put 15:13 55:19 77:22

82:6 91:19	recommended 83:15	56:15 69:12	role 7:19
putting 65:12	reconstructing 64:5	remote 67:12	room 50:23
	reconstruction 14:21, 23,25	remotely 7:12	rotated 73:1
Q	record 7:5 33:10,13 58:2,5 76:1,4,7 80:22 84:20 88:17,20 91:22 92:20,23 93:2	repair 73:21,24,25 74:1 81:25	rotation 90:19
Qualitatively 52:25	recorded 7:17	repaired 81:14 82:2	Russ 9:17
question 12:12,15,17, 19 25:24 47:6 53:23 54:5 55:15 60:8,11,13, 21,24 63:5 65:8,11,14 66:25 68:4,10,17 78:22 84:2,19 85:3 87:21 88:23	records 82:2	repairs 82:3	
questions 91:14,18	redeposit 36:19	repeatedly 24:3	S
quick 75:12	reduce 82:14 83:4 84:14,16 85:6,10 87:3, 4,6,9	rephrase 65:15	scatter 30:25
quickly 20:8	reduced 83:3 87:1	replaced 80:1,6 81:15	scenario 48:18
	reduces 82:13 83:2 85:5,6,9	reporter 10:4,5 43:13 47:5,7 60:12 80:19 84:18 92:23,24	scheduled 11:5
R	refer 16:7	request 13:11 61:2	Schroeder 8:8,11
rate 92:5	reference 18:18 34:11 38:18 46:18 47:21 62:10 73:24	requested 29:12	science 26:2
reach 38:8	referenced 13:2 37:25	resistance 48:4,5 49:12,16 50:12,13 51:2, 7,12,20,24	scientific 80:9
reached 62:19	referencing 27:24 40:11 46:5,10	respect 15:23 44:8 85:15	scope 15:3
read 60:11,13 80:19,22 84:19,20 85:4	referring 45:7 46:19,25 47:18	restate 81:9	Scordalakis 9:22,23, 24
reading 28:13 92:19,20	refers 62:22	resting 62:18	screen 13:25 14:7 17:9 18:2 29:14 30:7 34:19 53:25 55:1 58:11 64:16 77:22,25 89:2
reads 73:16	regard 8:17 15:19 61:20 87:11	result 19:14 23:23 32:11,16 37:8 49:10 50:13 51:25 73:25 77:8 79:3 80:10	searching 68:9
ready 10:3 58:8	regularly 33:2	resulted 50:12 51:13 57:20	secondary 32:8
reason 39:11 44:10 81:24	reinforced 18:13	results 87:2	section 14:13 18:9 40:3 65:24 72:9,11 73:6,14 78:4,8 82:3,6
reasonable 26:1 80:8	related 15:4,21 38:18 44:16,23 73:11 78:15, 19 91:12	retained 10:16,19	selected 19:4,5 66:5
rebuttal 11:1 12:23 91:11	relates 35:18	revealed 73:17 74:11	send 17:13 92:10
recall 11:21 27:3 33:18 34:5 41:1 60:2 67:25 89:10	relating 15:11	review 13:12 14:1 87:12	sending 52:14
received 11:5	relation 24:20 25:25 65:2	reviewed 12:25 87:8, 11,13	sentence 46:11 47:15 62:25
recess 33:11 58:3 76:2 88:18	relative 7:8	risk 22:16	separate 20:8 48:1 50:25 56:16
recharge 33:1	relying 33:22	risks 83:9	separated 41:18,21 44:17 48:19,23 49:3,4, 14 50:11,14 53:19 54:7, 13,20 56:6 59:23 60:15, 17 72:10,13 79:17,18 90:10
recognizing 12:5	remaining 51:18 53:9	road 59:4	separates 48:14
recoil 74:15 75:5	remember 29:12 45:22	roadside 64:25 79:25 80:3,6,15 81:1,16 82:10	separating 47:18
recoiled 76:13		Robertson 8:4,5	separation 18:14,15 19:25 20:1,3,6,7,25

25:21 37:20 39:15 43:7 45:11,14 47:13,14,16, 17,21 48:12,14,17,24 49:20,23,25 51:15 52:21,24 54:2,4 57:19 58:13 60:19 66:12,20, 25 67:8,12 69:3 70:14 71:11 89:11 90:13,15, 16 91:1	22 56:17 57:3,4,7 58:14,21,22 59:6,15 61:4,8,24 62:4 63:21, 23,25 64:6,22,23 67:2, 8,12,16,17,18,24 68:18, 25 69:6,10,17,21 70:2 71:8,18 72:1,17 73:1,16 74:10,14,15,16,21 76:13,16,22 77:1,11 79:10,11,17,21 80:4,13, 25 81:4,6,11,19 82:8 85:18,20,25 86:11 89:21 90:20	slaps 77:19 sleeves 81:14,25 slide 30:1,6 31:20 32:9 33:16 34:20,23,25 35:2, 12,13,16,17,18 37:4,25 39:8,9,10 40:15,19,22, 24 41:1,4,5,8,9,13,21 42:6,11,12,16,18,24 43:2,3,10,16,18 44:22, 23 53:24,25 54:6,15,17, 19,25 55:1,18,19 56:2, 14,20,25 57:2,8,13 64:14,15,16 65:20 68:1, 19,22,23 69:6,21 70:9, 10,13 72:6,15,18 77:20 78:24 79:23 80:11 88:25 90:14,25	spots 68:23 70:13 74:25 77:3,6,12,19 81:13 spotting 78:14,25 79:3, 12,22 80:2,11 81:21 Spreter 8:21,22 standpoint 66:24 stands 54:5 start 24:6 48:8 53:10 56:14 61:2 72:6 91:24, 25 started 20:15 45:6,8 starting 7:20 starts 46:10 48:11 state 7:14 15:4,18 18:11 26:1 80:8 states 46:12 stating 81:7 stayed 49:2
September 21:20,24 22:12 served 14:2 service 73:19 74:7,11, 13,17,21 75:8 76:14 severed 51:3 53:11,22 91:6 severing 53:1 share 17:9 29:14 Shawn 9:20 sheet 16:13 shinier 27:11 Shkolnikov 9:7,8 short 32:25 57:23 72:12 76:7 88:11 show 13:25 14:6 19:5, 7,20 29:23 31:2 32:19, 21 40:16 41:4 43:20 44:12,13 46:13 50:8 54:18,19 57:12 63:1 67:21 68:1 77:20 88:25 90:22 showed 34:22 77:18 showing 40:3 shown 80:12,23 shows 31:3,10,11,17 34:23 35:21 39:14,17 41:11,13 42:22,25 43:16,20 49:5 55:22 56:20 61:24 68:23 72:15,18 82:9 side 11:17 18:7,10 19:9 20:13 24:12 25:10 28:19,23 30:17,24 33:23 36:11,25 37:1 38:25 39:14,24 40:3,4 43:8 50:11 52:21 53:18 54:2,3,10,11 55:2,8,21,	sides 50:5 90:17 sign 92:17 significance 31:18 35:9 39:10 68:21 similar 24:16 40:6 81:15 Simon 8:14,15 12:11, 12 17:13 29:16 43:11 60:5,17 65:8 68:2 84:10 91:19,24 92:3,9,19 Simon's 61:2 simply 62:3 63:7 simultaneously 17:20 single 82:25 sir 10:13,18 13:13 14:18 18:2,6 21:3 25:4 26:16 28:5 30:6 31:11 37:12 38:17 42:5 44:19 46:8, 22 47:3,10 49:18 52:2, 19,22 55:11 57:21 58:9, 19 63:8 64:18 68:13 73:15,23 76:11,15 81:3 82:18 85:3 87:10,20 89:3 91:9 92:18 site 32:23 sitting 32:2 slap 14:24 50:1,3,9 56:5,7,8 67:1,3,9,11,22, 23 68:11 69:10,19 70:4, 6,9,12 73:4 74:11 77:12 83:6 slapping 20:14 50:6 63:21,22,25 64:2,3,4 66:25 67:18 68:24 73:17 77:3,6,9 81:14 82:16 83:5 85:12	slides 13:1 15:9 29:4 31:9 32:19 38:22 40:16 43:19 44:20 46:6 63:10 64:11 77:17 sliding 66:1 small 30:23 31:4 soft 51:4,13 soften 51:7,24 softening 52:17 solution 83:14 sounded 47:7 Sounds 57:25 spacers 82:13 83:7,8 84:16 87:21 spacing 38:7 span 67:24 86:25 87:18 speaking 17:20 26:17, 19 27:13 specific 87:18 spectrum 31:8 speculate 27:20,22 speculating 28:2 splice 68:17,18 73:20 81:25 82:9 spliced 81:14 spot 59:15 81:5	steel 18:13,14 36:4,5, 17 37:5,8,9,19 41:6 45:12 47:13,16,18,22, 25 48:2,3,4,7,13,18,23 49:2,8,10,15,21,25 50:4,10,19 51:1,7,13,18 52:15,16,17,21,24 53:7, 8,14 54:7,9,12,13 55:7, 23,25 56:9,10,11,18,21 57:8,17,19 69:14 85:24 89:8,22 Steno 7:7,13 10:5 16:23,25 29:13 step 55:13 Steven 9:23 Stevens 8:7,8,9,12 stop 14:16 41:20 76:19 stopped 85:12 stopping 75:11 77:3 stored 22:3,18 28:8 storing 23:20 straight 19:22 25:19 strand 20:22 27:6,18 35:2 36:14 37:4,10,15

48:10 60:19
strands 18:12,19,24,25
19:6,9,21 21:15 22:14
23:5,6 24:13,19 26:15
27:24 28:11,18 29:5
34:1 39:1,7,12 40:2,12,
21 41:5 42:3 43:17,20
44:22,25 45:11,23 46:2,
11,13 47:12,25 48:1,19,
22,24,25 49:2,5,13
50:4,7,14,20,25 51:4,16
52:15 53:1,6,11,15,17,
22 54:1,15,17 55:4
56:16 62:23 63:1 68:25
69:15 71:8,16,20,23
72:3,16 73:7 76:18,20
81:13,21 85:24 86:16
stress 87:4
stresses 24:3 82:15
83:4 86:8
strike 15:2 22:7 23:21
27:21 49:23 52:3 53:4
56:9 81:8
strong 59:9
struck 44:17,18
studied 34:6
studies 27:16 44:6
52:4 87:11,12
study 51:10 56:24
stuff 29:17
sub-opinions 12:21
13:2 88:9 91:12
subject 22:8 24:15,20
25:11 26:3 29:5 30:19
31:7,20 35:2 37:16,23
44:16 46:20 73:8 74:2
76:23 87:18
subjected 22:14
subrogating 8:20 9:9,
15 10:1
subrogation 8:2,9,12
9:1,12
successful 16:8
sufficient 59:18
suggest 17:9 32:15
Superior 7:14

support 35:10 37:22
38:19 46:5 67:8
supports 44:21 56:2
supposed 51:22
surface 20:13 21:9
22:20,21,23,24 23:2,3,
5,6,7,9 26:15 27:18,23
30:21,23,24 31:2,3,4,9
32:6,19,20,22 34:2,23,
24 35:14,20,21 36:1,9,
11,19,25 44:13 50:3,6,8
57:17 61:16 68:23,25
73:17,20 75:9 90:18,19
surfaces 20:8 23:18,22
24:7 25:18 27:8 32:21
surround 53:15
surrounded 91:5
surrounding 47:25
52:16 85:24
swear 10:5
swinging 86:5
sworn 10:8

T

takes 21:13 24:5 25:6
26:9,14,19 27:9 29:1
75:5
taking 7:18,20 48:12
talk 21:15 27:13 84:6
talked 45:23 91:9
talking 47:16 60:9,20
63:11 84:4
technical 29:17
telling 46:4
tells 30:18 42:9 61:9
temperature 48:13
50:23
Ten 33:4,6
tensile 18:15 47:14,17,
22 48:11 49:9,19 50:1,
2,11 51:25 52:17,20,23
53:6,8,13,19 54:7,14
56:21 57:4,6 89:11,15,
25 90:10,12,17,22

terms 39:2 42:1 66:10
76:19,21 77:4
testified 10:8 78:19
85:23 87:2 90:7
testify 15:4
testifying 76:21 89:10
testimony 15:19 16:1
34:6 90:4
testing 52:9,13 87:5
text 17:23
theory 52:10
thermal 86:4
thing 26:8 32:8 90:20
things 28:8 64:19
thought 64:13 89:24
90:1
thousand 19:5
threshold 51:6
tie 69:7
time 7:10 10:24 11:19
12:7 13:6 16:5 19:17,24
20:9 21:11,13 22:13,24
24:4,5,14 25:8 26:9,14
27:8,10 29:1,16 31:9
32:1,11 33:9,12 38:4
39:5 46:20 51:15 52:12
58:1,4 60:3 69:16 75:25
76:3 82:22 83:21 85:22
86:20,21 87:24 88:16,
19 89:6 91:10,18,21,24,
25 93:1
times 26:5 31:1 52:11
92:8
tiny 72:11
tip 60:9,10,21 61:1,3,5,
7,8,12 63:9 90:16
today 7:10 10:4 12:6
tons 67:19
top 41:11 55:4,5 56:17,
22 64:21
topic 15:25 52:5
torsional 19:23 25:19
71:10

total 40:8
totally 59:21
touching 75:9
transmission 83:13
trial 10:24 12:7,15 13:8
87:24 91:10
true 90:14
turn 17:3,14
type 14:23 32:2
types 19:18
typical 23:19 25:18
29:21 44:14 61:17
68:24

U

ultimate 66:9
ultimately 51:25 86:9
unable 24:18
understand 10:15
12:19 16:24 22:6,8
60:23 75:2 84:8,10 85:3
understanding 21:22
22:1 74:9
understood 45:24
68:10
unfair 65:13
uniformly 51:21
unknown 65:23
unlimited 86:7
unwrapped 72:14
upload 17:3,6,10
uploaded 29:12
upper 68:25
Utilities 7:23 9:24
utility 83:19,24 84:22

V

vague 60:7 65:9 68:16
78:18 84:2,11

vagueness 12:13

vapor 36:7

vaporize 36:18

vaporized 37:9

vaporizes 36:7,8

vapors 35:25

verbally 11:19

versus 19:14 21:5
27:25

vibration 82:14 83:3
84:7,14,16 85:5,6,9,15,
21 87:1,7,9

vibrational 84:6

vibrations 85:19 86:2,
4,7

video 7:12,17 15:19
59:2 60:2

view 7:13 10:16 11:7
15:7,22 24:25 25:15
29:14 57:5

views 56:23 83:23
84:21

visualize 54:21

Volume 7:18 92:25

voluminous 16:4

W

W-9 92:10

waiting 85:1

wanted 63:13 70:23
88:5

WEDNESDAY 7:1

west 39:14 40:13 54:1,
16 55:21 58:14,21,22
59:6,23 60:15 61:3,12
64:22 73:18 74:15,21
75:1

Westerlind 8:11

Westerlund 8:10,11

wind 47:8 60:1 82:22,
25 85:22 86:1,3

wire 21:14 22:14 28:24
53:14

withstand 50:20

witnesses 15:21

Witt 9:14

word 43:11 60:18

wording 12:16

words 21:4 44:10 52:14

work 17:24 57:11

worked 83:13,24 84:23

working 11:12 83:18,
20

works 85:8

wrapping 64:23

Y

year 21:5 26:3

years 21:5 26:7,11,19
27:25 28:3 35:6 37:17,
23 38:12 47:1 83:12
86:21,22

yesterday 11:12,18

Z

zinc 35:23,25 36:2,4,5,
7,11,14,16,18 37:9,14
38:8