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1 IN THE UNITED STATES DISTRICT COURT
2 FOR THE NORTHERN DISTRICT OF GEORGIA
3 ATLANTA DIVISION

4 DONNA CURLING, ET AL., :
5 :
6 PLAINTIFFS, :
7 vs. : DOCKET NUMBER
8 : 1:17-CV-2989-AT
9 BRAD RAFFENSPERGER, ET AL., :
10 :
11 DEFENDANTS. :

12 **TRANSCRIPT OF BENCH TRIAL - VOLUME 8A PROCEEDINGS**

13 **BEFORE THE HONORABLE AMY TOTENBERG**

14 **UNITED STATES DISTRICT SENIOR JUDGE**

15 **JANUARY 19, 2024**

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21 ***MECHANICAL STENOGRAPHY OF PROCEEDINGS AND COMPUTER-AIDED***

22 ***TRANSCRIPT PRODUCED BY:***

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I N D E X T O P R O C E E D I N G S

<u>WITNESS</u>	<u>PAGE</u>
<u>THE PLAINTIFFS' CASE (Continued)</u>	
J. ALEX HALDERMAN PH.D.	
Cross-Examination (Continued)	
By Mr. Tyson	7
Redirect Examination	
By Mr. Andreu-Von Euw	111
Recross-Examination	
By Mr. Tyson	130
Examination	
By The Court	134
MEGAN MISSETT	
Direct Examination	
By Mr. Brown	152
Cross-Examination	
By Ms. LaRoss	158
Redirect Examination	
By Mr. Brown	174
JANICE JOHNSTON	
Cross-Examination	
By Mr. Oles	176
Cross-Examination	
By Mr. Cross	192
Direct Examination	
By Mr. Miller	194
JUAN GILBERT PH.D. (Videotaped Deposition)	199
RICARDO DAVIS	
Redirect Examination	
By Mr. Oles	201
* * *	
CERTIFICATE	208

P R O C E E D I N G S

(Atlanta, Fulton County, Georgia; January 19, 2024.)

THE COURT: Have a seat.

All right. Where are we at?

MR. TYSON: Your Honor, good morning. I had two brief items before we get started back with Dr. Halderman.

First, I don't know what is happening in Sandy Springs. But Mr. Belinfante encountered another downed tree on his way here this morning. So he's delayed and asked me to --

THE COURT: A conspiracy against him.

MR. TYSON: Apparently.

And I also wanted to confirm for the Court that the items we discussed in chambers yesterday have been delivered to Mr. Cross per what we discussed.

THE COURT: All right.

MR. TYSON: Thank you.

THE COURT: Yes, sir.

MR. OLES: Judge, I have one administrative matter I would like to mention briefly before we get underway today. We had requested to be able to question Dr. Jan Johnston who was a listed witness on the plaintiffs' will call list. We had requested that the last two days. Among the plaintiffs' group I understand that she was released from her subpoena last night.

THE COURT: That she was released from what?

1 MR. OLES: From her subpoena last night by parties
2 not clear to me. However, she is willing and available to
3 testify, and at the appropriate time I would like to call her
4 for about 30 minutes, if that is acceptable.

5 MR. CROSS: Yeah. Your Honor, as we let Mr. Oles
6 know, we object to that. We served the subpoena. He is
7 mistaken. She was on our may call list, not a will call list.
8 So it is -- the rule as I understand it, you can rely on a will
9 call list because you can expect the witness is there.

10 THE COURT: Who is Ms. Johnston, first of all?

11 MR. CROSS: She's on the SEB. She's an SEB member.

12 Our view is it is not necessary. We examined, I
13 think, three -- at least three members of the SEB. We have
14 reserved the right to call her on rebuttal depending on how the
15 case unfolds. But we think at this point her testimony would
16 be cumulative and we need to finish the plaintiffs' case today.

17 And if Mr. Oles wanted to --

18 THE COURT: I think it would be more appropriate to
19 deal with this separately. You know, we can have a bench
20 conference when we take a break. I need to know what you're
21 seeking to do -- what you're -- you know, if you're -- what
22 you're seeking to elicit and we'll take care of it then.

23 MR. OLES: Certainly, Judge. Thank you.

24 THE COURT: Anything else we need to address?

25 Is Dr. Halderman here?

1 Come on back.

2 Dr. Halderman, remember that you are still under
3 oath.

4 Thank you.

5 **THE PLAINTIFFS' CASE (Continued).**

6 Whereupon,

7 J. ALEX HALDERMAN PH.D.,

8 after having been previously duly sworn, testified as
9 follows:

10 CROSS-EXAMINATION (Continued)

11 BY MR. TYSON:

12 Q. Good morning, Dr. Halderman.

13 A. Good morning.

14 Q. Before we get started today, did you discuss the substance
15 of your testimony with counsel for plaintiffs after the court
16 adjourned yesterday?

17 A. No, I did not.

18 Q. Did you discuss your testimony with Ms. Marks?

19 A. No.

20 Q. So, Dr. Halderman, we finished talking about Antrim County
21 yesterday or at least initially.

22 I wanted to move to some other questions regarding
23 vulnerabilities and various systems.

24 So you would agree that every computer system has
25 vulnerabilities; right?

1 **A.** Yes, to varying degrees.

2 **Q.** And you would also agree that security or cybersecurity
3 more specifically is a sliding scale; is that right?

4 **A.** Well, yes and no.

5 **Q.** Would it be accurate to say that a system can be either
6 more secure or less secure as opposed to secure or insecure?

7 **A.** There are degrees of security. The question we are most
8 interested in in security typically is whether a system is --
9 is adequately secured against the threats that it faces.

10 **Q.** And when you say adequately secured, are there national
11 standards or other written policies that govern what adequate
12 security is in the voting context?

13 **A.** In a voting context, the -- in a voting context, what
14 election security experts -- what election security experts
15 look for is that the system generates adequate evidence of the
16 correctness of its outcomes independent of any potential
17 failures or vulnerabilities in technology.

18 **Q.** So is that a no, there is not written standards but there
19 is something that election security experts look for, in your
20 mind?

21 **A.** I can't point to a government standard. But there is a
22 scientific standard.

23 **Q.** And zooming back out to software generally, you would
24 agree that a vulnerability found in a piece of software can be
25 remediated in a variety of ways; right?

1 **A.** Yes. There are -- there can be multiple ways to remedy a
2 problem.

3 **Q.** One of those ways could be a software update; right?

4 **A.** Typically a software update for a particular problem is
5 the preferred way of correcting the problem if it is a type of
6 problem that can be corrected through a software update.

7 **Q.** Someone could also, depending on the type of
8 vulnerability, implement physical security measures as a
9 possible remedy; right?

10 **A.** Physical security controls more typically would be an
11 additional layer of protection, sort of a fail-safe.

12 It is like providing a parachute in case there is a
13 problem with the plane. But if you have to rely on those
14 controls to remedy your problem, then, you know, you've already
15 had a serious problem with your aircraft.

16 **Q.** So physical security can be a way to address a
17 vulnerability, but you would not want it to be the exclusive
18 way to address a vulnerability?

19 **A.** That is right. Because in security, we usually rely on
20 layers of defenses. And if some of those layers of defenses
21 have failed, we're much more likely to be compromised because
22 the other layers of defenses are typically imperfect.

23 **Q.** And part of an ability to address a vulnerability is the
24 ability to detect an attack; right?

25 **A.** Yes.

1 Q. Now, you would agree that the Dominion equipment used in
2 Georgia elections is certified by the Election Assistance
3 Commission; right?

4 A. Yes.

5 Q. I want to go back to our discussion about Antrim yesterday
6 briefly.

7 I believe you testified that you had concerns after
8 learning that SullivanStrickler had imaged some voting
9 equipment in Antrim County; is that right?

10 A. Yes.

11 Q. Do you recall when you first learned that
12 SullivanStrickler had imaged voting equipment in Antrim County?

13 A. I don't recall when it first came to light or when I first
14 learned of that.

15 Q. Do you recall reading about it in the Washington Post in
16 August of 2022?

17 A. I think it is likely I read that.

18 Q. And have you informed anyone in the Michigan election
19 space about that imaging, since you learned about it?

20 A. So I know that the Michigan -- my -- the people I work
21 with on the Michigan Bureau of Elections, I know we have
22 discussed it.

23 The new information that came -- that I became aware of in
24 testimony this week had to do with the likelihood that they
25 used the same USB sticks in Antrim County as well and that the

1 USB sticks were used with a laptop with the Kaspersky software.

2 I think those are facts that I would like to communicate
3 to the State of Michigan to confer with them about any
4 potential additional risks.

5 **Q.** Do you recall when you first learned that any third
6 parties had access to Coffee County's election equipment?

7 **A.** I don't recall when I first learned that.

8 **Q.** Have you listened to Ms. Marks' phone call with Mr. Hall?

9 **A.** I don't think I have heard the call. I have heard about
10 it, of course.

11 **Q.** So let's talk a little bit more about the vulnerabilities
12 in the Dominion system used in Georgia.

13 I believe you testified yesterday that there were more
14 vulnerabilities in the Dominion equipment than what you
15 identified in your report; is that right?

16 **A.** Yes. I'm confident that there are more.

17 **Q.** And you would agree that installing an update to the
18 Dominion software, like Version 5.17, wouldn't solve every
19 vulnerability in a Dominion ICX; right?

20 MR. ANDREU-VON EUW: Objection, Your Honor.
21 Relevance.

22 MR. TYSON: Your Honor, I believe the scope of the
23 remedy in terms of what the Court would order is encompassed by
24 this. In addition to the degree of vulnerabilities and the
25 ability to remedy the vulnerabilities is certainly very

1 relevant factors for this Court's consideration.

2 THE COURT: Well, I don't know what is in 5.17. And
3 I don't have a foundation for that. I don't know that that is
4 what the Court is looking for as a remedy either. I mean,
5 that -- so I'm not sure that it is fully within the scope of
6 what he has testified.

7 I mean, you can -- and -- that is my greater concern.
8 I mean, there may be a way you can lay a foundation for
9 questions about it. But I don't -- it is not helpful to the
10 Court, let me -- at the moment, as you have asked it.

11 BY MR. TYSON:

12 Q. Dr. Halderman, you have a list in front of you of ten BMD
13 vulnerabilities validated by CISA; is that right?

14 A. Yes.

15 Q. If every one of those BMD vulnerabilities validated by
16 CISA that you testified about yesterday was remediated by
17 updates to Dominion equipment, that would leave vulnerabilities
18 untouched on the Dominion system; right?

19 A. That's right. I think it is important to remediate these
20 vulnerabilities promptly as CISA says as soon as possible. But
21 merely remediating the problems that CISA validated that are
22 discussed in my expert report is not going to make the ICX
23 secure. There are just so likely to be -- there are certainly
24 going to be other vulnerabilities that I didn't discover.

25 Q. So it is correct then that remediating the software

1 vulnerabilities that you identified and CISA discussed, without
2 changing anything else about how Georgia conducts elections,
3 would not eliminate the risks you've identified to Georgia's
4 election system; right?

5 **A.** Yes. So the problems I found are an indication of the
6 brittleness of the software in the ICX. And so merely
7 addressing these specific problems would not be enough to
8 rectify that just brittle engineering and design that went into
9 to creating this machine.

10 **Q.** And in your testimony, in your report, you don't quantify
11 what the level of reduction of risk would be for Georgia if the
12 ten vulnerabilities on the list from CISA were remediated;
13 right?

14 **A.** My report -- no. My report attempts to qualify that. But
15 there are not good metrics for such a thing.

16 THE COURT: When you say qualify that, what do you
17 mean by qualify that?

18 THE WITNESS: I write in the report that addressing
19 merely the vulnerabilities directly outlined in my report would
20 be unlikely to significantly raise the overall security of the
21 system because of the brittleness of the software architecture
22 that the vulnerabilities are a symptom of.

23 BY MR. TYSON:

24 **Q.** And, Dr. Halderman, you're aware of logic and accuracy
25 testing conducted before an election; right?

1 **A.** Yes.

2 **Q.** And you would agree that in your opinion there is no logic
3 and accuracy testing that Georgia counties could conduct that
4 would always detect malware in a BMD that uses barcodes; right?

5 **A.** So I agree with that that -- in the sense that logic and
6 accuracy testing is not a -- an effective countermeasure to
7 malware for the reasons that I've discussed.

8 Logic and accuracy testing can be an important way of
9 addressing other forms of attacks on the system. However, the
10 style of logic and accuracy testing performed in Georgia is
11 unlikely to be effective even for that.

12 **Q.** And you relied on the exhibit attached to your July 1st
13 report regarding how Georgia conducts logic and accuracy
14 testing for your conclusions about the sufficiency of Georgia
15 L&A testing; right?

16 **A.** Yes.

17 **Q.** But even if that process was different or more rigorous
18 than the exhibit attached to your report, your opinions about
19 the sufficiency of L&A testing in Georgia to detect malware
20 would not change; right?

21 **A.** Specifically for malware, that's true.

22 **Q.** You talked a little bit yesterday and in your report about
23 audits. Is it your opinion that Georgia cannot conduct an
24 actual -- I'm sorry. Let me start over.

25 It is your opinion that Georgia cannot conduct an actual

1 risk-limiting audit as long as it is using BMDs with QR codes;
2 correct?

3 **A.** Yes. A risk-limiting audit needs as an input to the audit
4 an accurate representation of voters' selections.

5 **Q.** And it is also your opinion that there is no type of audit
6 Georgia could conduct that can address the vulnerabilities in
7 the Dominion ICXs that you identified; is that right?

8 **A.** Not that can address them completely.

9 **Q.** We've heard discussions at various points about a forensic
10 analysis of election equipment.

11 Do you recall that?

12 **A.** I am not sure specifically what you're pointing to.

13 **Q.** You would agree that even if you had full access to every
14 component of Dominion equipment in Georgia you can't rule out
15 the possibility that malware was installed on that equipment;
16 right?

17 **A.** That's right. Because among other things, malware could
18 be programmed to remove itself when it was finished or malware
19 could reside only in memory so that it disappeared after the
20 equipment was shut down.

21 **Q.** And in terms of physical security for voting equipment,
22 you would agree that there are no physical security measures
23 that Georgia counties could undertake that would completely
24 avoid the risks from potential hackers to the ICXs; right?

25 **A.** Yes. There are -- there are better and there are worse

1 physical security protections. But I agree with that.

2 **Q.** And you believe that no county facility can ever be safe
3 from a nation-state attacker; right?

4 **A.** Again, there are better and worse protections you could
5 implement. But I agree with that.

6 **Q.** And you believe no Secretary of State facility can ever be
7 safe from a nation-state attacker; right?

8 **A.** Not completely safe. But again, this is why the overall
9 engineering of the election system to be resilient to failure
10 of those controls is so important, which is what the -- what
11 the difference between a hand-marked versus a universal BMD
12 system is.

13 **Q.** In fact, I believe as we discussed in 2019, you don't
14 consider your own lab to be safe from a nation-state attacker;
15 right?

16 **A.** We certainly try to make it difficult. But I think if a
17 national government -- if a powerful state was targeting me
18 individually, I'm not sure that I could defend against that. I
19 wouldn't want to bet on that.

20 **Q.** And, in fact, you're aware the University of Michigan
21 network suffered a period of unauthorized access for four days
22 in August 2023; right?

23 **A.** Yes, I am.

24 **Q.** And that resulted in the University taking its network
25 offline, didn't it?

1 **A.** Yes, it did.

2 **Q.** And your lab is located at the University of Michigan?

3 **A.** Yes, it is.

4 **Q.** And you kept the malware that you designed for the
5 Dominion ICXs in your lab; right?

6 **A.** Yes. On securely encrypted hard drives.

7 **Q.** But again, you can't be sure if unauthorized nation-state
8 attackers have accessed that malware; right?

9 **A.** No. But I think the threat model that is appropriate to
10 apply here would be that although we certainly have been
11 diligent about protecting the results of this -- of this
12 testing from any kind of inappropriate access, a nation-state
13 actor who wanted to reproduce any of this work wouldn't need my
14 code to do that. They could do that on their own without
15 access to anything that I have done.

16 The most important actors to prevent getting access to the
17 malicious software and other results of this work are actors
18 who couldn't independently reproduce it.

19 **Q.** Dr. Halderman, you have never personally evaluated the
20 physical security of Dominion equipment in a county facility in
21 Georgia; right?

22 **A.** No. I've evaluated -- I have never personally in person
23 evaluated that physical security. But I have asked election --
24 you know, polling place observers to look for particular
25 things. I've looked at photographs that people have taken for

1 me. And I have looked at images that have been taken by the
2 press to evaluate that security.

3 **Q.** And who are some of those poll watchers that you have
4 relied on for that information?

5 **A.** Ms. Marks. Harri Hursti. I'm sure others associated with
6 this lawsuit who I forget.

7 **Q.** And I believe you testified yesterday regarding what you
8 just referenced on the layout of Georgia precincts.

9 Is that the reference you made to looking at pictures of
10 various polling locations?

11 **A.** Yes.

12 **Q.** And the sources of those pictures were media reports and
13 then photographs taken by poll watchers; is that right?

14 **A.** Yes.

15 **Q.** Do you know how many of Georgia's 159 counties those
16 reviews covered?

17 **A.** I believe -- I would be speculating. But I don't have the
18 number in my head. But I believe on the order of ten counties
19 of different sizes.

20 **Q.** Do you know approximately how many county polling place
21 layouts you have seen in those pictures? Different polling
22 locations I mean.

23 **A.** Different locations? I don't -- I can't say sitting here
24 today.

25 **Q.** But you're not claiming to have evaluated the layout of

1 the thousands of precincts in Georgia regarding their Dominion
2 equipment; right?

3 **A.** I've evaluated a sample of Georgia polling place layouts.
4 And, again, my conclusion is that at least in many cases it
5 would be possible. I'm not offering a fraction.

6 **Q.** The sample you evaluated was selected by media sources and
7 by Ms. Marks and Mr. Hursti; is that right?

8 **A.** It was what was available to me. That is right.

9 **Q.** Are you sure that is a representative sample of polling
10 places in Georgia?

11 **A.** It included counties of varying sizes which leads me to
12 believe that it would reflect the diversity of polling places
13 in Georgia to a significant extent. I'm not relying on it to
14 be completely representative because I'm not offering a
15 fraction.

16 **Q.** You have your notebook from yesterday. If you could turn
17 with me to the CISA advisory, Curling Plaintiffs' Exhibit 89.
18 It is behind Tab 2.

19 **A.** Yes.

20 MR. TYSON: Mr. Martin, if we could have
21 Mr. Montgomery be able to display that.

22 Thank you.

23 BY MR. TYSON:

24 **Q.** So, Dr. Halderman, beginning with the summary section, the
25 second paragraph, CISA stated exploitation of these

1 vulnerabilities would require physical access to individual
2 ImageCast X devices, access to the election management system,
3 or the ability to modify files before they are uploaded to
4 ImageCast X devices.

5 And you agree with CISA about that statement; right?

6 **A.** Yes.

7 **Q.** Do you also agree with the statement at the end of that
8 paragraph that says many of these mitigations are already
9 typically standard practice in jurisdictions where these
10 devices are in use and can be enhanced to further guard against
11 exploitation of these vulnerabilities?

12 **A.** Yes. In some jurisdictions -- many of these
13 jurisdictions, many of these mitigations are practiced.

14 **Q.** And you have not conducted an analysis of any Georgia
15 county's current practices regarding these CISA
16 recommendations; correct?

17 **A.** I have not conducted an analysis. But I don't believe I
18 have seen any evidence in this case that practices have been
19 changed in significant ways that would be what CISA means when
20 it says diligently practice these mitigations.

21 **Q.** Turning to the fourth page, this bullet list is the
22 mitigation CISA recommends; right?

23 **A.** Yes.

24 **Q.** The first one involves an action by Dominion to create
25 updates to its software; is that right?

1 **A.** Yes.

2 THE COURT: I'm sorry. The fourth page?

3 MR. TYSON: Yes, Your Honor. The fourth page.

4 THE COURT: This is Page 3 of 3.

5 MR. TYSON: Oh, I'm sorry. I was looking at the
6 numbers at the top. It is the third -- the last page.

7 THE COURT: All right.

8 BY MR. TYSON:

9 **Q.** The next bullet says to ensure all affected devices are
10 physically protected before, during, and after voting; right?

11 **A.** Yes.

12 **Q.** And you're aware that Georgia has regulations for its
13 counties regarding physical protection of voting equipment;
14 right?

15 **A.** Yes.

16 **Q.** The next bullet says ensure compliance with chain of
17 custody procedures throughout the election cycle; right?

18 **A.** Yes.

19 **Q.** And you're aware that Georgia has regulations for its
20 counties regarding chain of custody; right?

21 **A.** Well, yes. But I'm not sure that ensures compliance.

22 **Q.** I'm sorry. What -- are you saying the county is not
23 ensuring compliance in your opinion?

24 **A.** That CISA's advice, CISA's recommended mitigation is to
25 ensure compliance with those procedures. Not merely to have

1 those procedures.

2 **Q.** Do you have any evidence that Georgia counties are not
3 complying with chain of custody procedures?

4 **A.** No. But I'm not sure I have -- I'm aware of evidence that
5 they are, either.

6 **Q.** The next bullet says ensure that ImageCast X and the
7 election management system are not connected to any external,
8 i.e., internet accessible networks. Is that right?

9 **A.** Yes.

10 **Q.** Are you aware Georgia has regulations regarding the
11 connection of voting equipment to internet connected networks?

12 **A.** Yes.

13 THE COURT: Are you going to be spending time asking
14 him is he aware of regulations as to each of these items?
15 Because I bet the plaintiffs could stipulate to that. But I
16 don't think that goes to his issue of it doesn't -- having a
17 regulation does not mean something has been ensured or
18 addressed in reality.

19 MR. TYSON: Your Honor, maybe I could ask a question
20 this way.

21 BY MR. TYSON:

22 **Q.** Dr. Halderman, in looking at the list of mitigations in
23 the CISA report, do you have any evidence that Georgia counties
24 are currently not complying with any of these bullets?

25 **A.** Mr. Tyson, the most recent forensic data from the State

1 that has been made available to me indicates Georgia counties
2 have not complied with several of these bullets.

3 And that is -- that is I think what I can say to that.

4 **Q.** So let me begin with forensic data. What are you
5 referring to when you say forensic data?

6 **A.** Election project files from past elections in Georgia
7 counties. For instance, EMS images and so on. Data from the
8 election system.

9 **Q.** What is the most recent election package file you've
10 received from the State? For which election?

11 **A.** I don't have the data in front of me. 2021 or '22.

12 **Q.** And then you said there were several bullets you are aware
13 that Georgia counties are not complying with.

14 Which of these bullets are those?

15 **A.** The most recent -- would you like to go through bullet by
16 bullet?

17 I don't -- I'm not quite sure how long an answer is
18 appropriate to this.

19 But ...

20 THE COURT: Why don't you just go ahead and identify
21 the ones that give you the most concern. Let's just start that
22 way.

23 THE WITNESS: Thank you, Your Honor.

24 I am very concerned about -- about -- I'm very
25 concerned about the lack of software updates that I understand

1 persists to address this problem and the apparent inability to
2 quickly update problems when they were reported to the
3 manufacturer in terms of the first bullet.

4 I am quite concerned about the second bullet and the
5 physical protections as the evidence of the intrusion in Coffee
6 County and subsequent reports from Mr. Barnes and Coffee County
7 that the election equipment was not physically secure even
8 after the breach.

9 I am very concerned about the adequacy of the
10 equipment seals and other protective measures that are in
11 place.

12 There were several specific changes to use of the ICX
13 that CISA recommends that are important that I have seen -- I
14 have not seen evidence in this case that Dominion -- excuse me,
15 that Georgia has applied. Those include the closing the
16 background applications and using unique passwords and
17 disabling the unify security key setting.

18 And, of course, CISA's last bullet emphasizes the
19 risk of attacks that cause the barcode to be manipulated in a
20 way that is inconsistent with a human readable text and
21 emphasizes the importance of conducting the -- a rigorous post
22 election tabulation audit, which would need to apply to the
23 contest in which the cheating happened. And I'm concerned that
24 such audits are too infrequent to address that.

25 So speaking specifically to these mitigations listed

1 here, those are the ones that immediately jump to mind as most
2 concerning.

3 BY MR. TYSON:

4 **Q.** Dr. Halderman, you referenced the Coffee County
5 unauthorized access regarding physical security; right?

6 **A.** Yes.

7 **Q.** The date of this advisory is June 30th, 2022; correct?

8 **A.** Yes.

9 **Q.** And are you aware of any Georgia county allowing
10 unauthorized access since June 30th, 2022?

11 **A.** Not as I sit here today. Although I'm not -- also not
12 aware of -- I haven't seen evidence in this case of changes to
13 the protections against physical access as a result of the
14 Coffee County breach.

15 **Q.** You mentioned seals as well. Is your concern about seals
16 based on the state of the Fulton equipment you received in this
17 case?

18 **A.** The Fulton equipment gives me -- is another source of that
19 concern. But that concern is based on the -- that concern is
20 based -- is based predominantly on the state of seals that I
21 have seen in images taken from polling places.

22 **Q.** And that refers to the roughly ten counties where you have
23 seen those seals in pictures?

24 **A.** Every picture I have ever seen of a Georgia machine in use
25 has lacked seals in important locations, in every picture in

1 which the seals are -- are visible.

2 **Q.** Do you have an estimate of what percentage of the pictures
3 that you reviewed at various precincts have seals visible?

4 **A.** When I'm talking about the -- my estimate is precincts in
5 approximately ten counties. Those are ones in which the seals
6 are visible. There are, of course, many pictures of Georgia
7 precincts in which the seals are not visible in addition to
8 these I reference.

9 **Q.** And you have not provided these pictures of polling places
10 that you relied on as part of your analysis in this case;
11 right?

12 **A.** I don't -- I don't know.

13 **Q.** Last you mentioned tabulation audits and the frequency of
14 those, the last bullet; right?

15 **A.** Yes.

16 **Q.** And I believe you testified a few minutes ago that there's
17 no type of audit that would sufficiently ensure that no malware
18 was installed on Dominion ICXs in your opinion; right?

19 **A.** Yes. So -- and a -- no type of audit is going to be
20 sufficient to address the threat that malware has altered all
21 records on the ballot.

22 Now, that doesn't mean that audits are not still important
23 because they change which attacks are possible and in which
24 election scenarios. So it wouldn't completely address the
25 threat to apply more rigorous auditing while still using the

1 ICX. That doesn't mean it wouldn't be a step forward.

2 **Q.** So, Dr. Halderman, it is your belief that there are no
3 ballot-marking devices on the market today that could be used
4 for all in-person voters in an election system that produces
5 reliable results; right?

6 **A.** Well, Mr. Tyson, once again, there are -- there are --
7 there are degrees. The system that Georgia uses has been -- I
8 think my expert report has shown, the vulnerabilities that CISA
9 has confirmed has shown that it suffers from an extreme degree
10 of vulnerability.

11 I was here yesterday. I got superuser access with a pen.
12 Right? So I think the character of the vulnerabilities is
13 significant.

14 **Q.** My question was a little bit different.

15 My question was: It is your belief that there are no
16 ballot-marking devices on the market today that can be used for
17 all in-person voters in an election system that produces
18 reliable results; right?

19 **A.** I would agree with that in the sense that we -- that I
20 can't point you to a commercial BMD available today that --
21 that would produce ballots that would be strongly verify --
22 strongly auditable as a record of voters' intent.

23 That is not to say it is impossible to produce such a BMD
24 system. I don't know. Juan Gilbert has some interesting
25 proposals. Though they are radically different from the BMDs

1 used in Georgia. So it may be possible.

2 **Q.** But of BMDs on the market today, Dr. Gilbert's ideas don't
3 exist in those?

4 **A.** I don't know if Dr. Gilbert is selling his system. I
5 think he has a patent on it. He may be trying to.

6 But from the major manufacturers -- from the major
7 manufacturers, there -- there -- the AuditMark may still be
8 available, which is a BMD design that -- that has a somewhat
9 different risk profile.

10 But I would -- I would still have to agree that it
11 doesn't -- I would still have to agree that it wouldn't produce
12 a record that was a strong basis for a risk-limiting audit.

13 **Q.** And it is also your belief that a BMD that prints, for
14 lack of a better term, a full-face ballot, an absentee ballot
15 with the bubbles filled in instead of a QR code, also cannot
16 produce reliable results; is that right?

17 **A.** So again, I think there are some important changes to
18 degree of risk that come from that.

19 THE COURT: Come from having a full-face ballot?

20 THE WITNESS: Come from having a -- come from having
21 a full-face ballot that makes some important modes of attack
22 much more difficult.

23 I wouldn't agree that it remedies all of the risks.
24 But I would -- I would consider that an improvement compared to
25 the barcode-based ballots.

1 BY MR. TYSON:

2 Q. And you can't quantify the degree of improvement from a
3 risk profile; correct?

4 A. No. I'm not offering a quantification.

5 Q. Dr. Halderman, it is correct that you believe the only
6 option for having a secure election system is to use
7 hand-marked paper ballots for most voters who vote; right?

8 A. I wouldn't say that that is necessarily the only way. But
9 I think it is the most practicable.

10 Q. What are the other ways that would have a secure election
11 system where hand-marked paper ballots are not used for most
12 voters?

13 A. There is very interesting work being done on end-to-end
14 verifiable voting systems that involve cryptographic
15 techniques, for instance.

16 THE COURT: Which involve what?

17 THE WITNESS: That involve cryptographic techniques
18 to give the voter a way to directly verify that their ballot
19 has been counted and correctly included in the total.
20 Microsoft is working with jurisdictions to field systems with
21 that property now.

22 BY MR. TYSON:

23 Q. But for election equipment available to jurisdictions
24 today, the only system in your opinion for having a secure
25 election system is a hand-marked paper ballot system; right?

1 **A.** I think some of this equipment might be actually
2 available, if not immediately, then in the very near future,
3 that offers this other route of techniques that are in
4 widespread use today.

5 I would say a hand-marked paper ballot is the -- a
6 predominantly hand-marked paper ballot system is the one that
7 successfully achieves security.

8 **Q.** And it is also your personal belief that hand-marked paper
9 ballots are the best election system; right?

10 **A.** My personal belief?

11 Yes, I suppose so.

12 **Q.** Dr. Halderman, I know you served -- I believe it is -- did
13 you say it is Michigan election commission? What is the title
14 of the election group you serve with in Michigan?

15 **A.** The state's Election Security Advisory Commission.

16 **Q.** You would agree that there is a lot of factors a decision
17 maker has to consider when choosing a voting system; right?

18 **A.** I suppose any important decision involves a lot of
19 factors. Security is clearly one that should be -- security is
20 clearly something that should be a requirement in the result of
21 such a decision.

22 **Q.** And another factor would be accessibility of the
23 equipment; right?

24 **A.** Yes.

25 **Q.** And the ability of poll workers to operate the equipment;

1 right?

2 **A.** Yes.

3 **Q.** And the method of reporting election results?

4 **A.** Sorry. The method of --

5 **Q.** Is one of the factors you would have to consider the
6 method of reporting election results?

7 **A.** What do you mean?

8 **Q.** For a jurisdiction, how election results are reported to
9 the public is a factor they would consider in the selection of
10 a system; right?

11 **A.** Sure. I suppose so.

12 **Q.** Another factor is cost; right?

13 **A.** Yes.

14 **Q.** Another factor is ease of use for voters; right?

15 **A.** Yes.

16 **Q.** And your testimony in this case only deals with the
17 security issues involved in election systems; right?

18 **A.** I have considered also those other factors in my -- in my
19 work in election systems.

20 **Q.** And my question wasn't about your work in election systems
21 but your testimony in this case.

22 Have you considered factors beyond security for the
23 opinions you're offering in this case?

24 **A.** I believe I have touched on some of those other factors in
25 the declarations and reports I've submitted in this case.

1 Q. How did you consider the factor of cost in rendering your
2 opinions in this case?

3 A. I've considered -- I've considered what it would -- I have
4 considered the cost of securing election technology involving
5 BMDs versus not. And a lot of the costs of -- the cost of
6 achieving -- the cost of achieving security in a predominantly
7 BMD system, if you internalize those costs, if you actually
8 realized those costs, would be enormous.

9 Q. And it is your position you have submitted that as an
10 opinion in this case?

11 A. That's a factor that I considered in -- that is certainly
12 a factor that I considered -- that I have considered in my --
13 in forming my views that I'm offering.

14 Q. And in terms of risks involved with systems, you've not
15 quantified the risks of the Dominion BMD system as compared
16 with other election systems; right?

17 A. I believe my report touches on that as well.

18 Q. Your report quantifies the risk of the Dominion BMD system
19 versus other systems?

20 A. My report indicates that it is greater than other systems,
21 which is ...

22 Q. But you can't tell the Court the degree to which it is
23 greater; right?

24 A. I can offer that it is a significant degree greater
25 than -- we would have to talk about a specific scenario.

1 Q. But you have no way to measure significance because you
2 have no standard you're measuring against; right?

3 A. In security, often when we're talking about risks, it is
4 by degrees rather than by percentages. That is just typical in
5 cybersecurity.

6 Q. Let's talk a little bit about what you analyzed with the
7 Dominion system.

8 You analyzed the ICX, the BMD; correct?

9 A. Yes.

10 Q. And you analyzed the ICP, which is the precinct scanner;
11 correct?

12 A. Yes.

13 Q. You didn't analyze other components of the election
14 system; correct?

15 A. I also analyzed the EMS configuration.

16 Q. And that was in?

17 A. Georgia.

18 Q. I'm sorry.

19 And that --

20 A. Used in Georgia.

21 Q. And your analysis of the EMS was of the Coffee County EMS;
22 correct?

23 A. Yes. Though as I testified, the EMS is very likely to be
24 a standardized configuration across much of the State.

25 Q. So I want to get some terminology just so we're clear to

1 talk about the various demonstrations you did yesterday.

2 Beginning with the demonstration you performed using a
3 technician card here on the BMD in the courtroom, would you
4 consider that the installation of malware or the altering of a
5 ballot definition file?

6 **A.** You mean -- you mean specifically the way that I changed
7 the -- I changed the vote recorded on the ballot in the
8 demonstration I gave in court? That was altering the ballot
9 definition file.

10 **Q.** Okay. So you would not consider that installing malware;
11 is that right?

12 **A.** That is right.

13 **Q.** And then the video that we watched with the Bash Bunny
14 unit attached to the USB cable, you would consider that
15 installing malware on the ICX; right?

16 **A.** Yes.

17 **Q.** And so in terms of malware that is actually installed on
18 the BMD itself, the only piece of malware that you have
19 demonstrated for the Court is the Bash Bunny attack on the
20 video yesterday; right?

21 **A.** Yes.

22 **Q.** And the attack that you demonstrated in September 2020
23 installing a unit between the BMD and the printer, that was
24 essentially putting malware in between the BMD and the printer?
25 Would that be accurate?

1 **A.** Well, that was installing a malicious hardware device
2 between the BMD and the printer or inside the printer, as I
3 describe in my report.

4 **Q.** And the installation of that hardware device inside the
5 printer required you physically soldering the unit to the
6 printer internal components; right?

7 **A.** Not necessarily. You could also do it by, say, tampering
8 with the cable, replacing the cable with one that had a chip
9 built into it that would do the same thing. There are various
10 ways it could be accomplished.

11 **Q.** I understand there are ways it could be accomplished. But
12 specifically in what you put in your report, you had soldered
13 the unit to the internal components of the printer; right?

14 THE COURT: I'm sorry. Which report?

15 MR. TYSON: In his July 1st report, Your Honor.

16 THE WITNESS: Yes. The demonstration that we did for
17 the report involved physically modifying the printer itself.
18 It could be done in the supply chain. It could be done with
19 physical access to a printer.

20 BY MR. TYSON:

21 **Q.** And is the malware that we saw installed on the video to
22 the ICX the only piece of malware that you have designed for
23 your opinions in this case?

24 **A.** No.

25 **Q.** What are the other pieces of malware you have designed

1 related to your opinions in this case?

2 **A.** The -- my expert report discusses several pieces of
3 malware.

4 **Q.** Maybe I can clarify, Dr. Halderman. I'm talking
5 specifically about malware installed on the BMD itself.

6 **A.** Yes. My expert report described several pieces of malware
7 that I designed as demonstrations which work in different ways.

8 **Q.** And have you updated or changed those pieces of malware
9 since your report was issued in July 2021?

10 **A.** I developed an additional piece of malware.

11 **Q.** Is that a piece of malware you are relying on for your
12 opinions that you're presenting to the Court in this case?

13 **A.** No. It is just a demonstration of the -- it is the
14 demonstration of the same capabilities for malware that are
15 discussed in my report.

16 **Q.** And you originally designed a piece of malware that
17 flipped votes between President Trump and President Biden;
18 right?

19 MR. CROSS: Your Honor --

20 THE COURT: Yes.

21 MR. CROSS: -- I thought we weren't going to get into
22 sealed information, particularly that, which we discussed in
23 chambers.

24 MR. TYSON: Your Honor, my understanding of our
25 discussion in chambers was I could ask my question of

1 Dr. Halderman. If he felt like it was getting too deep into
2 source code material, then he could notify me and the Court and
3 we would defer that question until later.

4 MR. CROSS: Except he literally just quoted something
5 that was sealed.

6 MR. TYSON: I asked a question.

7 MR. CROSS: And we didn't present it for the very
8 political reason that he may be walking into. This is not
9 appropriate.

10 THE COURT: All right. Well, I guess you're going to
11 have to come up here because you're going to have to address
12 how you're proceeding.

13 **(A bench conference ensued, as follows:)**

14 THE COURT: All right. So not having read the full
15 transcript over again but talking with my colleagues in
16 chambers, I think that what was clear that you had been
17 requested not -- not to mention a Trump/Biden ballot, first of
18 all.

19 MR. TYSON: In the chambers conference, Your Honor?

20 THE COURT: Yes.

21 MR. TYSON: I apologize. I don't recall that at all.

22 THE COURT: That is all right. I mean, there are a
23 lot of things that I can't remember too. That is why I needed
24 to have people tell me. But because it is just too -- it gives
25 a whole different cast of everything. So, A, I'm -- you need

1 to veer away from that immediately.

2 I think it is one of the reasons they used a liquor
3 example and other things rather than doing a Trump/Biden.

4 Secondly, my understanding was that if you -- if
5 Dr. -- and I think you were trying to pursue this. If there
6 was a question as to malware development that you thought
7 was -- if he is not comfortable speaking about that, we would
8 handle that in camera. There may be more ways of flagging that
9 in advance if you know what -- so that we don't end up looking
10 like, you know -- like the Court is dancing around this and
11 concealing things. But at the same time it is not appropriate
12 for this to be discussed in a public realm.

13 So you just -- you could discuss what ones you're
14 wanting -- want to raise. We could take a break and then --

15 MR. CROSS: I think -- so my thought was this, Your
16 Honor. He can explore the line of questioning about there was
17 code that was inspected. It had different candidate names.
18 That is fine, if that is what he wants to explore. I don't
19 think we need to name the candidates.

20 What I will say is, we kind of can't unring the bell.
21 And so at this point I almost would rather him complete that
22 one question but enable Dr. Halderman to say why did you change
23 this candidate names and so it is clear that he didn't change
24 this for anything substantive. He changed it because of
25 concerns about the inflammatory nature of these two candidates

1 and the current climate.

2 I kind of defer to what everybody thinks, but the
3 problem is that is now in the public record. So I don't have a
4 problem if you follow up and say why you did make the change.
5 But going forward I think just keep it -- the questions
6 nonspecific.

7 MR. TYSON: Well, and to be clear, what I'm trying to
8 explore also is changes from the original version of the
9 malware --

10 MR. CROSS: Right.

11 MR. TYSON: -- to the current version of the malware.
12 So I think I could explore that through did you previously
13 alter different races. I don't have to identify --

14 MR. CROSS: Sure. That is right.

15 MR. TYSON: -- to identify a specific race.

16 MR. CROSS: Okay. That's what I thought.

17 MR. TYSON: But are we good finishing the answer to
18 that question and me following with a why?

19 MR. CROSS: Because it is public, I would rather give
20 him an opportunity to say why he made the change. And then we
21 can -- then just more non-descript.

22 MR. TYSON: Yes.

23 MR. CROSS: Okay.

24 MR. TYSON: And this really was just getting into the
25 changes, and then I was moving to the next topic. So this

1 is -- yeah.

2 THE COURT: All right. Go ahead.

3 MR. CROSS: Thanks, Judge.

4 MR. TYSON: Thank you, Your Honor.

5 **(The bench conference was thereby concluded.)**

6 THE COURT: Go ahead.

7 BY MR. TYSON:

8 **Q.** Dr. Halderman, I believe we had just asked about whether
9 you previously had different races that were involved in the
10 versions of the malware than the ones that were presented to
11 the Court.

12 **A.** Yes. For the expert report, the malware we developed
13 targeted contests on a real Georgia ballot that was available
14 to me during the testing.

15 For purposes of the courtroom demonstration, I adapted it
16 to a demonstration ballot in a future mock election.

17 **Q.** And is there a reason why you modified that ballot from an
18 actual Georgia ballot?

19 **A.** Simply because the -- simply to avoid overly politicizing
20 the questions involved.

21 **Q.** Dr. Halderman, let's talk about some of the conclusions
22 that you reached about the ICX BMDs.

23 One of the things you determined is that Dominion BMDs are
24 not sufficiently secured against technical compromise; right?

25 **A.** Yes.

1 Q. And you didn't quantify what sufficient security is in
2 your report; right?

3 A. I don't quantify it. But again, Mr. Tyson, I basically
4 hacked into it with a pen yesterday in front of you. I mean,
5 we could talk about -- we can talk about sufficient. But I
6 think wherever you are going to reasonably draw the line, this
7 is not on the sufficient side of it.

8 Q. But to be clear, your opinion of sufficiency is not based
9 on an ability to quantify the degree of risk? It is based on
10 your sense of the degree of risk; right?

11 A. I'm not offering a quantification. I'm offering a
12 qualification and whether this -- a qualification based on the
13 vulnerabilities that I talk about, that I describe in the
14 report.

15 Q. And I believe we covered this. But you're not also
16 relying on sufficient security as compared to any particular
17 documented security standards for election equipment; right?

18 A. What do you mean? A government standard or there is a
19 scientifically accepted standard that is -- that the election
20 system is going to produce public evidence sufficient for
21 people to confirm the outcome is right.

22 Q. And no ballot-marking device that you're aware that is
23 available right now meets that standard?

24 A. Yes.

25 Q. You also conclude that it was easier to compromise

1 Dominion BMDs than it was to compromise the AccuVote TSxs;
2 right?

3 **A.** Yes.

4 **Q.** And that is despite the ballot-marking devices having a
5 paper trail unlike the DREs; right?

6 **A.** Yes.

7 **Q.** You also reference that an attacker -- and I think you
8 demonstrated here -- could alter the QR code and the human
9 readable text; right?

10 **A.** Yes.

11 **Q.** You also conclude the ICX was designed -- designed without
12 sufficient attention to security; right?

13 **A.** Yes.

14 **Q.** And again, you're not quantifying sufficient security in
15 the design in your report in this case; right?

16 **A.** I'm not quantifying it. But there's just a radical
17 difference in character between systems that are designed with
18 security as verse -- principle versus ones where it is an
19 afterthought. And this is in that latter category.

20 **Q.** And when you submitted your report in July 2021, you
21 believed that attackers already possessed the information and
22 skills needed to exploit vulnerabilities in Dominion equipment;
23 right?

24 **A.** Yes.

25 **Q.** And you wrote this report in this case before you knew

1 about access to the Coffee County equipment; right?

2 **A.** Yes.

3 **Q.** And so it was your expert opinion that the information
4 needed to hack the ICX was already available to attackers
5 before the Coffee County breach; right?

6 **A.** Well, to -- certainly to some categories of attackers. I
7 think the breach still materially decreased the security that
8 the ICX can offer because the exact system configuration used
9 in Georgia was stolen by the -- as part of the breach.

10 **Q.** But you would agree that Dominion software had been
11 released publicly prior to the Coffee County data being
12 released; right?

13 **A.** Yes. Or significant components of it had been.

14 **Q.** And that was releases from other states that used the same
15 or similar equipment; right?

16 **A.** Yes.

17 Excuse me. I think I did misspeak. The software -- yes,
18 I did misspeak. Can -- you -- you asked whether the software
19 had been publicly available prior to the Coffee County breach.

20 **Q.** Let me ask --

21 **A.** I think that is --

22 **Q.** I think I know --

23 **A.** -- that is not true.

24 **Q.** So let me be more clear.

25 Prior to you learning -- I'm sorry.

1 Prior to your July 1st report, you were aware that
2 Dominion software had already been publicly released; right?

3 **A.** Yes. Significant components of it were leaked by some of
4 the same people involved in the Coffee County breach.

5 **Q.** And those leaks happened before your July 1st report; is
6 that correct?

7 **A.** I'm trying to -- I'm trying to remember the specific
8 timeline. The same summer at Mike Lindell's cyber symposium.
9 I don't know if that was prior to my report.

10 **Q.** But in either case, the release was prior to the release
11 of information from Coffee County that came to light in this
12 case; right?

13 **A.** No. I think that was after the Coffee County incident
14 took place, if that is what you mean.

15 THE COURT: So we've got two dates here. There is
16 when it came to light to the public --

17 MR. TYSON: Uh-huh (affirmative).

18 THE COURT: -- versus when it occurred.

19 MR. TYSON: True.

20 THE COURT: And I think that is what is confusing
21 here is Mr. Lindell had access to the information at an early
22 point. He was involved in it. And it was in January of '21.

23 That is -- the report came out -- your report came
24 out in July of '21. More information about Coffee County
25 breach to the public at large came out some substantially after

1 that.

2 MR. TYSON: Thank you, Your Honor.

3 THE COURT: I think that's why this is confusing
4 about Mr. Lindell. Because if he also had a voting forum,
5 which I don't know that the witness knows, it sounds like, the
6 exact date, the voting forum still seems like it was after he
7 had access to this data, had even been in Coffee County with
8 another tech person from Cyber Ninjas in January of '21.

9 Does that make sense to everyone? I hate to be
10 testifying. But this is all in the record.

11 MR. TYSON: That is a helpful clarification, Your
12 Honor.

13 Thank you.

14 BY MR. TYSON:

15 **Q.** So, Dr. Halderman, you would agree that Dominion software
16 was released from jurisdictions in Arizona; right?

17 **A.** Well, released I'm not sure is the right word. But
18 outside parties were able to access it, Cyber Ninjas through
19 the audit.

20 **Q.** And then the Cyber Ninjas made the Dominion software
21 available publicly; right?

22 **A.** I don't believe that was the Arizona software was made
23 public. But at Mike Lindell's cyber symposium software taken
24 from Antrim County in Michigan and from Mesa, Colorado, was
25 made public.

1 **Q.** In your report you also discuss threats to elections.
2 Do you recall that?

3 **A.** Yes.

4 **Q.** And in today's world, you would agree that threats to
5 elections exist regardless of whether Georgia uses
6 ballot-marking devices or hand-marked paper ballots; right?

7 **A.** Well, there are certainly threats in both cases. But I
8 think the character of those threats and how they play out is
9 radically different.

10 **Q.** Do you recall discussing in your report that Dominion
11 scanners ignore the ballot text and exclusively count the votes
12 that are encoded in the QR code?

13 **A.** Yes.

14 **Q.** And you would agree that the same scanners ignore the
15 human readable text of hand-marked paper absentee ballots and
16 count those ballots based on coordinates of the bubbled-in
17 areas; right?

18 **A.** Well, that is -- that is technically correct. But I think
19 it leads to the wrong impression about the way that counting
20 process might work.

21 So the scanners are programmed with the coordinates of the
22 bubbles. But that is something that can be tested through
23 logic and accuracy testing, unlike these other factors.

24 **Q.** So let's talk a little bit more about the attacks you
25 demonstrated yesterday.

1 I want to begin with the video of altering only the
2 barcode and not the human readable portion.

3 Are you with me?

4 **A.** Yes.

5 **Q.** You would agree that an audit could detect that type of
6 attack; correct?

7 **A.** So, again, yes and no. So to the extent that the attack
8 changed the outcome and the audit was targeting the contest in
9 which the attack took place, an audit would be likely to detect
10 it. But an audit is not going to detect that attack if it
11 occurs in a contest that is not targeted by the audit.

12 An audit is not necessarily going to detect the attack as
13 it affects individual voters if the cumulative effect of the
14 attack is insufficient to change the election outcome.

15 **Q.** And you can't identify the frequency of any type of
16 risk-limiting audit that would be required to detect an attack
17 that only alters the barcodes; right?

18 **A.** Again, as I say, there are reasons why risk-limiting audit
19 is not necessarily going to be sufficient to detect that
20 attack. It could detect that attack in a race the audit
21 targeted if the attack caused significant -- changes sufficient
22 to change the election outcome. But that is not a question
23 about frequency. If those conditions aren't met, the audit
24 isn't going to detect the attack.

25 **Q.** And you're not aware of any state that currently uses a

1 risk-limiting audit that would always detect attacks that only
2 alter the QR codes; right?

3 **A.** No. That's in part my understanding why Colorado got rid
4 of the -- as -- required that -- the barcodes to be removed
5 because they want their risk-limiting audits to -- to be strong
6 enough to -- to detect problems.

7 **Q.** You believe that Georgia conducting risk-limiting audits
8 is a positive step for security and voter confidence; right?

9 **A.** Well, of course. It is a positive step. Doing
10 risk-limiting audits as opposed to not is a step in the right
11 direction. It doesn't mean that you've achieved security. But
12 it is -- it is certainly better than nothing.

13 **Q.** Do you know how many states besides Georgia conduct
14 statewide risk-limiting audits?

15 **A.** Oh, boy. This number has changed a lot in the past few
16 years. I can't -- I can't sitting here today give you
17 something I would be confident in.

18 THE COURT: Well, it has changed a lot. It has
19 increased a lot? Is that --

20 THE WITNESS: It has increased, yes.

21 BY MR. TYSON:

22 **Q.** Do you know if it is more than half the states?

23 **A.** I don't -- I don't know if it is more than half. And --
24 but also because people have intentions for this coming
25 election year, and I'm not sure whether they have implemented

1 all of them yet.

2 **Q.** Does Michigan conduct a statewide risk-limiting audit of
3 all races on the ballot?

4 **A.** No, not yet. But that is one of the things that in
5 talking with the Michigan Department of State I know people
6 are -- are eager to do for all significant contests.

7 **Q.** Does Michigan conduct a statewide risk-limiting audit of
8 any type?

9 **A.** Michigan conducts a statewide, yes. Does have a statewide
10 risk-limiting audit that they have done after the -- after the
11 past several major general elections.

12 **Q.** And how many races are audited?

13 **A.** So in each of those audits, it targeted only a single
14 contest. That is probably the most -- the most that Michigan
15 has done at once so far.

16 **Q.** Next on the attack that altered the barcode and the text,
17 like the one you demonstrated with the George Washington,
18 Benedict Arnold election --

19 **A.** Yes.

20 **Q.** -- it is your opinion that that attack would go undetected
21 because voters don't check their ballots carefully enough;
22 right?

23 **A.** It is -- in essence, yes.

24 **Q.** Did you first develop the technician card method of
25 installation of the ballot -- changing the ballot definition

1 file before or after your July 31st report was issued?

2 **A.** The method is one that I -- that is -- I describe the
3 general case in the report. As a demonstration, I prepared it
4 after the report to demonstrate one specific way in which that
5 could be done.

6 **Q.** And the demonstration you performed in court yesterday,
7 since it altered the ballot definition file, would affect every
8 ballot that was issued from that ballot-marking device after
9 that particular attack; right?

10 **A.** Yes. That's right. Because that was just the change to
11 the ballot definition file. I have also prepared malware that
12 can make changes to both the QR code and the text in more
13 programmatic ways so it would not necessarily be every one.
14 But that is not what was demonstrated.

15 **Q.** And the demonstration you performed yesterday would
16 ultimately affect a single BMD in a polling place; correct?

17 **A.** Yes, that is right.

18 Although once the ballots were in the ballot box, you
19 couldn't tell which ones from the -- had come from the affected
20 BMD.

21 **Q.** In your discussion yesterday regarding voters checking
22 their ballots, you referenced an article that I believe
23 Mr. Bernhard and you had worked on.

24 Do you recall that?

25 **A.** Yes. It was a number of my students and I.

1 MR. TYSON: Your Honor, may I approach?

2 THE COURT: Yes.

3 BY MR. TYSON:

4 Q. Dr. Halderman, I have handed you what we are going to mark
5 as Defendants' Exhibit 1231.

6 Is this the article that you referenced regarding voters
7 checking their ballots?

8 A. Yes.

9 MR. TYSON: Your Honor, we would move admission of
10 Defendants' Exhibit 1231.

11 MR. ANDREU-VON EUW: Your Honor, this is hearsay.
12 But no objection.

13 THE COURT: All right.

14 BY MR. TYSON:

15 Q. Dr. Halderman, you were one of the authors of this report;
16 right?

17 A. Yes. This is a group of my students and me are the
18 authors.

19 THE COURT: It is admitted.

20 BY MR. TYSON:

21 Q. Now, this article and the study that it discusses were
22 produced or were conducted after you were an expert for the
23 plaintiffs in this case; right?

24 A. Yes, I believe so. The case has been going on a very long
25 time.

1 Q. It is as old as my youngest child.

2 This study involved a mock election; correct?

3 A. Yes.

4 Q. And the study did not involve Dominion equipment; correct?

5 A. No. It involved a BMD that we had prepared for the study
6 as a stand-in for a generic BMD.

7 Q. And if you look down at the bottom right corner of the
8 first page, the last paragraph that begins we found that.

9 Do you see that?

10 A. Yes.

11 Q. And you say, we found that absent interventions only
12 40 percent of participants reviewed their printed ballot at
13 all?

14 A. Yes.

15 Q. And you found that interventions, meaning prompting a
16 voter to look at their ballot, encouraged people to do that and
17 they did review their ballots more frequently; right?

18 A. It raised the rate of voter verification somewhat.
19 Although as we discuss in the paper, not by an amount that
20 would be adequate to make verification of BMD ballots likely to
21 be an effective security control.

22 Q. And this study also found that further study was needed on
23 this topic; right?

24 A. Yes. We suggest further study before concluding that any
25 particular intervention would be sufficient.

1 Q. And in forming your opinions regarding voters checking
2 their ballots, did you take into account Georgia regulations
3 regarding poll workers prompting voters to check their ballots?

4 A. Yes, I did.

5 Q. And you would agree that at least some voters are going to
6 check their ballots on election day; right?

7 A. Yes. Some will.

8 Q. And you have never personally observed Georgia voters
9 voting on election day or any other time; right?

10 A. No, not personally.

11 MR. TYSON: So, Your Honor, I know I have been going
12 a little while. I'm at a change in topic if you want to take a
13 break, or I can keep going.

14 THE COURT: Do you need a break?

15 THE WITNESS: Sure. It has been a while.

16 THE COURT: All right. We'll take five minutes.

17 MR. TYSON: Thank you, Your Honor.

18 COURTROOM SECURITY OFFICER: Court will stand in
19 recess for five minutes.

20 **(A brief break was taken at 11:19 AM.)**

21 THE COURT: Have a seat. Go ahead.

22 BY MR. TYSON:

23 Q. Dr. Halderman, in terms of your analysis of the Dominion,
24 you weren't able to access -- you weren't able to obtain access
25 to the Dominion BMD you analyzed without an order from this

1 Court; right?

2 **A.** No. I obtained access under the order of the Court.

3 Others have been accessed without court order.

4 **Q.** And the only other Dominion equipment you are aware of
5 that was accessed outside of an election office was the one you
6 referenced for Mr. Hursti?

7 **A.** No, that is not right.

8 **Q.** Okay. You also gained access to election package files
9 through this case; right?

10 **A.** Yes, I did.

11 **Q.** And you spent roughly nine months or I think you said
12 12 person weeks studying the equipment; is that right?

13 **A.** 12 person weeks, yes.

14 **Q.** At the risk of doing math, I think we agreed that was
15 somewhere close to 500 hours of time; is that right?

16 **A.** Please don't ask me to multiply.

17 **Q.** And then you spent additional time working on the malware
18 after you issued the report in July '21; right?

19 **A.** To prepare the -- a demonstration for the Court, yes.

20 **Q.** And in your analysis, you have talked about achieving
21 security.

22 Just to be clear, there is not a document we can look at
23 of what achieving security means in an election context; right?

24 **A.** A document you can look at? There is a -- there is a
25 well-defined notion that there is plenty of scientific

1 literature about -- about elections that achieve affirmative
2 evidence of correctness.

3 **Q.** And it is your belief that any system that does not
4 present affirmative evidence of correctness is not a secure
5 system?

6 **A.** Does not achieve the scientifically accepted notion of
7 election security. That is right.

8 **Q.** If we could turn back to Exhibit 1231 just briefly, the
9 study about voter verification.

10 **A.** Yes.

11 **Q.** If you go to the second page, second -- or first full
12 paragraph. The first sentence says the risks notwithstanding,
13 BMDs do offer practical advantages compared to hand-marked
14 paper ballots.

15 Did I read that right?

16 **A.** Yes.

17 **Q.** And you agree with that?

18 **A.** Yes. So these are the reasons why it would be very
19 positive if we could find a way to use BMDs securely. That is
20 sort of the motivation for wanting to do this work.

21 **Q.** And one of the advantages of BMDs is voters of all
22 abilities can vote in the same manner; right?

23 **A.** So that is a -- frequently cited as an advantage of BMDs.

24 **Q.** And it is cited in the study that you helped author;
25 right?

1 **A.** Yes, it is.

2 **Q.** And BMDs offer an advantage in a more user-friendly
3 interface for voting; right?

4 **A.** Well, they provide one kind of user interface for voting
5 that is -- that can be user-friendly.

6 **Q.** Okay. And another advantage is that they can more easily
7 support complex elections like those conducted in multiple
8 languages; right?

9 **A.** Yes.

10 **Q.** And they can also simplify election administration in
11 places that use vote centers; right?

12 **A.** They can. Although there are other ways to do that.

13 **Q.** But in your paper that you are relying on here, you
14 identify each of those items as advantages of BMDs over
15 hand-marked paper ballots; right?

16 **A.** They can be, yes. But this is, again, the reason why --
17 why trying to find an effective -- why finding an effective way
18 to make voters contrary to fact effective at detecting errors
19 on ballots they vote with BMDs would be so important. But we
20 don't know how to do it.

21 **Q.** Couple paragraphs down, you reference that the rate of
22 intervention -- I mean, sorry, the type of intervention could
23 range -- result in a detection of errors up to 86 percent;
24 right?

25 **A.** The 86 percent figure is for -- a kind of intervention

1 that would be completely impractical in the real world. But
2 that just shows that -- that shows that the interventions that
3 we were applying in the study did have an effect on
4 participants.

5 **Q.** And another intervention was voters bringing a list of
6 candidates; right?

7 **A.** Yes. That is the one that would achieve -- that we found
8 achieved an 86 percent verification rate. If voters were
9 provided a slate of candidates and asked to vote that way then
10 vote --

11 THE COURT: You mean a hand -- a printed list of
12 candidates so they could compare them once they are out of the
13 voting booth? Is that what you mean?

14 THE WITNESS: Yes. So they would have something to
15 directly compare, exactly. But, of course, that advantage only
16 would apply in the real world to the fraction of voters who
17 took the time to make such a slate and bring it in.

18 So that is 80 -- that would be an 86 percent
19 improvement among those voters who -- who actually did use a
20 slate.

21 BY MR. TYSON:

22 **Q.** Do you know if Georgia voters are allowed to bring a
23 filled-out sample ballot with them to vote?

24 **A.** But that is exactly what I mean. The fraction of voters
25 who took the time to bring in a sample ballot among that --

1 that slice of the public you would expect to see an
2 improvement.

3 **Q.** But my question was: Do you know if Georgia voters are
4 allowed to bring a filled-out sample ballot in with them if
5 they so choose?

6 **A.** I don't know. That is typical in states that people are
7 allowed to do such a thing. But again, the -- typically is
8 only a very small fraction of voters do.

9 **Q.** Last question on this: One of the items for further study
10 was not just which interventions work but also more study about
11 whether voters verify their ballots; right?

12 **A.** Yes.

13 **Q.** Dr. Halderman, a couple of more specific questions about
14 some of the items in your report.

15 First, the vulnerability you identify of placing the
16 hardware unit between the ballot-marking device and the
17 printer, that was not a vulnerability that was part of CISA's
18 recommendations on this list of ten items; right?

19 **A.** Yes. Because -- and the reason for that is the
20 vulnerabilities that CISA reports on typically are things that
21 can be reduced to what is called a CVE, which is a -- sort of
22 an atom of vulnerability.

23 And the printer is more of a -- the printer issue is more
24 of a mode of attacking the system than a vulnerability -- a
25 software vulnerability that could be patched.

1 **Q.** And you indicate that you hard-coded attack contests,
2 meaning that this particular attack couldn't alter ballots in
3 more than one election; right?

4 **A.** So for each of the forms of attack that we implemented a
5 demonstration of, including the printer and the malware, I
6 thought it was very, very important not to build something that
7 was going to be a dangerous weapon if it did fall into the
8 wrong hands.

9 So we -- rather than writing general purpose malware that
10 would, say, look for a political party or the name of an office
11 only and make a decision about what to cheat that could affect
12 any ballot style, we did hard code it. But that is because we
13 didn't want to build a loaded gun.

14 **Q.** And you would need physical access to a printer and you
15 could only affect one printer at a time for that particular
16 attack; right?

17 **A.** You wouldn't necessarily need physical access to the
18 printer. A supply chain attack might be able to affect many
19 printers at once. So if the software in the printer from when
20 it was purchased was already malicious, that would be an
21 example of a supply chain attack.

22 **Q.** But to be clear, your particular attack discussed in your
23 report would require physical access to a printer; right?

24 **A.** No. Only the implementation of the attack that we
25 prepared as a demonstration of how this could be done would

1 necessarily require physical access because it is possible that
2 the same form of attack could be implemented through the supply
3 chain as one example.

4 **Q.** But you've only discussed the implementation in your
5 report, not other ways of implementing the same attack; right?

6 **A.** I do believe the report discusses other modes of
7 implementing such an attack.

8 **Q.** You mentioned you didn't want to build a loaded gun in
9 terms of malware. You have not seen malware that is
10 self-propagating across multiple elections that would affect a
11 Dominion BMD; right?

12 **A.** I'm sorry. I'm just parsing all of those qualifiers.

13 So I -- no. I have not seen it. It certainly would be
14 possible to create such malware.

15 **Q.** And you've never designed malware that would run on both
16 an AccuVote TSx platform and a Dominion BMD; right?

17 **A.** You asked whether I had designed such malware? No.
18 Although it could certainly be done.

19 **Q.** Talking about the ICX Smart card vulnerability that you
20 discussed yesterday, that vulnerability gives someone with
21 physical access additional access to software inside the BMD;
22 is that fair?

23 **A.** Yes. Anyone with physical access can unlock the BMD and
24 change -- make arbitrary changes to the software and data,
25 including potentially a voter.

1 Q. And for your infinite voter card discussions, you would
2 agree that there are opportunities for detection of someone
3 trying to use an infinite voter card in a precinct; right?

4 A. Yes. I would agree.

5 Q. And you would agree that if the scanner was monitored by a
6 poll worker this attack could be detected; right?

7 A. It depends on the form of the attack and how the attacker
8 was trying to use the infinite voter card.

9 Q. If someone printed three ballots while standing at a
10 ballot-marking device and went to put them in the scanner, a
11 poll worker would have the opportunity to notice one individual
12 feeding multiple ballots into a scanner; right?

13 A. Potentially, yes.

14 Q. And you would agree that at the conclusion of the
15 election --

16 THE COURT: You are talking just about one voter
17 doing three ballots?

18 MR. TYSON: Yes, Your Honor.

19 THE COURT: I don't think anyone -- that type of
20 ballot fraud has not been an issue in this case about
21 submitting multiple ballots. So I'm not sure why you are
22 asking about it.

23 MR. TYSON: One of the Smart card attacks that
24 Dr. Halderman designed allowed for the repeated printing of
25 ballots on a ballot-marking device. So my question related to

1 that attack, that it would be detectable in other contexts.

2 THE COURT: Well, it depends on who is doing it.
3 Whether somebody in the polls are doing it. Somebody else who
4 has had access to it. It seemed to assume that any fraud would
5 only be done by a voter as opposed to somebody who has access
6 to the machine to use it for that purpose.

7 MR. TYSON: Certainly, Your Honor.

8 And, actually, the next question was going to be
9 about insiders and how you would deal with that.

10 BY MR. TYSON:

11 **Q.** You would agree that if a county checked the number of
12 ballots that were scanned versus the number of individuals who
13 checked in that would be a way to detect someone inserting
14 multiple ballots; right?

15 **A.** Well, potentially. Although there are, quite frequently,
16 anomalies between the number of ballots and the number of
17 recorded voters in real polling places. That is called
18 balancing the polling place.

19 And polling places being out of balance is sometimes a
20 normal occurrence just because of human error. So that could
21 detect it. Whether that would reliably detect it and
22 distinguish such an attack from human error, I don't -- I can't
23 say that it would reliably detect it.

24 **Q.** And to the Judge's question about a corrupt insider, a
25 corrupt insider could print multiple ballots off of a BMD in a

1 BMD system or could mark multiple hand-marked paper ballots in
2 a hand-marked paper ballot system; right?

3 **A.** I think it depends on the attack scenario you are
4 envisioning. It is actually a very significant advantage of
5 the -- it is a very significant advantage of the hand-marked
6 system that you end up with a contemporaneous record as well.

7 So if you are talking about someone who was an insider
8 trying to change things after the election is closed, then I
9 don't think that that attack works as well. This is --

10 Actually, Your Honor, I think that is -- an insider
11 tampering with the paper ballots is something that the precinct
12 count optical scan technology is well set up as a form of
13 voting to defend against in either case.

14 **Q.** And when you refer to the precinct count optical scan,
15 you're referring to the images of ballots being captured at the
16 precinct; is that right?

17 **A.** Yes. So what I'm referring to is the images and the
18 ballot box having two records of the ballot is useful against
19 ballot box stuffing attacks by insiders in either mode.

20 So I worry less about the -- after voting is over someone
21 stuffing the ballot box. I do worry about the other attacks
22 that we have talked about more.

23 **Q.** And to be clear, the Dominion ICPs also capture images of
24 BMD voted ballots when those are being placed in the scanner at
25 the precinct; right?

1 **A.** Yes.

2 **Q.** For the malware that was installed via the Bash Bunny unit
3 on the video, did you hard code the names of candidates into
4 that particular malware?

5 **A.** Yes. As I explained, we didn't want to build a loaded gun
6 that would work against arbitrary ballots. But it could be
7 done.

8 **Q.** And I believe we covered this. But you have not created
9 malware that can alter results in multiple elections on an ICX;
10 right?

11 And when I say multiple elections, I mean different ballot
12 definitions.

13 **A.** Some of the malware can be targeted at more than one
14 election definition. But it is a matter of how you configure
15 the files. It is just you have to hard code for our
16 demonstration malware the contests and definitions that you
17 want to cheat.

18 We didn't want to build something that is going to be
19 absolutely general. It would be much more dangerous than it
20 needed to be for purposes of this case.

21 **Q.** So to be clear, if you were to place the Bash Bunny with
22 the malware loaded on it in a Georgia piece of equipment in an
23 actual election, it wouldn't accomplish an alteration of that
24 ballot?

25 **A.** No. Although the changes that someone would need to do to

1 make that the case are straightforward for any particular
2 ballot and the amount of work that would be needed to make
3 malware more general that would target any -- any future
4 election given a target party, a target office, arbitrary
5 roles, that would be straightforward for the -- for an
6 attacker.

7 Q. When you are writing software --

8 THE COURT: I guess I didn't understand the whole
9 conversation. You said, so to be clear, if you were to place
10 the Bash Bunny with the malware loaded on it in a Georgia piece
11 of equipment in an actual election, it couldn't -- it wouldn't
12 accomplish an alteration of that ballot.

13 THE WITNESS: Your Honor --

14 THE COURT: Are you -- I mean, we were talking -- as
15 I understood the Bash Bunny example, it wasn't -- it is seeking
16 to do an alteration of the ballot. It was trying to seek to
17 change -- change a vote.

18 MR. TYSON: Yes, Your Honor. And to -- in order to
19 accomplish that -- Dr. Halderman can talk about this, the
20 method by which that happens. But the hard coding he is
21 referring to means there is an injection of text. And he can
22 probably explain this better than I can.

23 THE WITNESS: Yeah. May I explain, Your Honor?

24 THE COURT: Yes.

25 THE WITNESS: I'm sorry that under the circumstances

1 this is unclear.

2 THE COURT: Well, I might just be slow.

3 THE WITNESS: The malware -- the malware we
4 prepared -- as part of the malware preparation process we
5 program into the malware to cheat in this very specific place
6 on this specific ballot --

7 THE COURT: Right.

8 THE WITNESS: -- by pointing it at the place, for
9 instance, in the QR code that is going to represent a vote for
10 yes on the specific proposition.

11 For that reason, if it was plugged into -- if my
12 demonstration device was plugged into a real Georgia BMD with
13 some different election, that is not going to have a direct
14 effect. That is a safety mechanism of what we have built.

15 But it would be possible with relatively
16 straightforward -- with straightforward changes instead to
17 instruct the malware to cheat on any ballot for a particular
18 contest or for a particular party, et cetera, as I explain in
19 the report.

20 THE COURT: Okay.

21 BY MR. TYSON:

22 Q. Dr. Halderman, in creating malware, you can -- or in
23 creating software generally, I'm sorry, you can summon
24 libraries that are part of an operating system to be loaded
25 with that particular piece of software; right?

1 **A.** Yes.

2 **Q.** And if you attempted to compile code without access to
3 those libraries, the code wouldn't compile; right?

4 **A.** Yes. Software is often built from other components.

5 **Q.** And the particular software we're discussing here included
6 calls to outside libraries; right?

7 **A.** Yes. I discuss several libraries in the report that it
8 makes use of for reading barcodes, things like that.

9 **Q.** Would you agree that a potential attacker would need
10 access to a BMD to test their modified application?

11 **A.** Not necessarily. With the data that was taken from Coffee
12 County, for instance, an attacker could recreate the
13 functionality in virtualization potentially and test without
14 direct access to a BMD.

15 **Q.** And when you discuss reverse engineering the APK file in
16 your report, that process generates logs; right?

17 **A.** Pardon?

18 **Q.** The process of reverse engineering an APK file generates
19 logs; right?

20 **A.** No.

21 **Q.** You also discuss that election officials could verify
22 QR codes by decoding them.

23 Do you recall that?

24 **A.** I'm trying to remember where. I'm not sure I remember.

25 **Q.** That's fine.

1 Let me ask this question: If the state of Georgia was to
2 place a QR code reader in each precinct, that would not address
3 your concerns about the use of QR codes; right?

4 **A.** Well, no. That wouldn't address my concerns. There are a
5 number of problems with such an approach.

6 THE COURT: Can you explain what those are?

7 THE WITNESS: Yes. So placing a QR code -- even
8 assuming that the QR code reader was accurate, it would be
9 essentially like voters checking the ballot themselves. They
10 would have to -- they would have to take the time to do the
11 process. And a QR code reader is only going to be able to
12 decode -- presumably is only going to decode the QR code and
13 the voter is going to have to make a comparison.

14 Perhaps someone could make a QR code reader that did
15 more than that. But a typical QR code reader would just say
16 here are the choices in the QR code. Is this how you voted?

17 THE COURT: And just because I've already been --
18 we've been sent down this line, if you had -- instead did not
19 have a QR code at all, then the individual -- it would be more
20 efficient -- the person would just look at what the ballot
21 said?

22 THE WITNESS: I think that would be more efficient
23 than using a QR code reader, that's true. There are other
24 practical problems with doing -- with having a QR code reader
25 decode these ballots, including that to get the information

1 that -- I -- depending -- let me say that again.

2 The QR code reader would have to be programmed with a
3 matching election definition to the scanner and to the BMD.
4 We've had instances like in DeKalb County where an error in
5 some of that programming has caused false positives that has
6 caused errors that produce -- that caused ballots to be scanned
7 the wrong way.

8 If all three of these units -- now you -- instead of
9 having two units to keep synchronized, you have three units to
10 keep synchronized. If one of them is not programmed the same
11 way as the others, you're going to -- you're going to have a
12 situation where voters think something is badly wrong with
13 their ballots. So it could cause false alarms.

14 Finally, the -- getting data out of the election
15 management system sufficient to decode these -- the barcodes, I
16 don't know a way to do that that would not potentially
17 introduce further security risks. Because to fully decode the
18 barcodes, you need the key for the message authentication code
19 on the barcodes. That comes out of the election -- the
20 election package on the EMS and is contained along with other
21 very sensitive cryptographic secrets.

22 So I discuss in the expert report why message
23 authentication codes are dangerous to -- are difficult for
24 third parties to verify because anyone who has the key to
25 verify them can also forge them. And that risk of the key that

1 could be used to forge the message authentication code's
2 falling into the wrong -- you know, being leaked out of the
3 system would increase if you were building infrastructure to
4 get it into QR code readers at every polling place.

5 I know that is a long tangent, Mr. Tyson. There are
6 some complex technical drawbacks to such a system.

7 BY MR. TYSON:

8 **Q.** Certainly.

9 But each -- if such a system existed, individual voters
10 would at least have the opportunity to verify what their QR
11 code on their ballot said and compare it against the human
12 readable text; right?

13 **A.** Yes. Assuming the readers were working correctly and
14 hadn't also been affected by some kind of security problem.

15 But actually -- and I think that is a very significant
16 issue though. So the voter has no way to know that the QR code
17 reader actually is reading the QR code the same way as the
18 scanner. That is sort of the fundamental problem with it.

19 I could have summarized much of what I just said as that.

20 THE COURT: So -- all right. I know you're a little
21 bit detouring here. But -- so then there is the upgrade to the
22 system that apparently -- of the Dominion system that is
23 apparently feasible and others have used of simply having no
24 QR code at all.

25 THE WITNESS: Yes.

1 THE COURT: So that is not really dramatically more
2 sophisticated software. Maybe it is less sophisticated. I
3 don't know. What is involved in that?

4 THE WITNESS: In the change to the software that
5 allows printing a ballot that looks like a traditional ballot?

6 THE COURT: Right.

7 THE WITNESS: The -- that -- newer versions of the
8 Dominion software than what Georgia uses support that.

9 Do you have a specific question?

10 THE COURT: That does not impose any more complex
11 software issues?

12 THE WITNESS: No, it wouldn't impose more complex
13 software security issues.

14 BY MR. TYSON:

15 **Q.** Dr. Halderman, but if a state upgraded to the Dominion
16 software that allowed for a full-face traditional ballot like
17 you described, that wouldn't solve the concerns about
18 manipulation if voters are not checking their ballots from a
19 BMD; right?

20 **A.** No, it doesn't fully address those concerns. What it
21 would do is make attacks that would otherwise be invisible to
22 voters because they are only in the barcode ones, that at least
23 voters had a potential opportunity to catch.

24 So that is the sense in which it is -- it would be
25 potentially an improvement over the status quo in Georgia.

1 Q. It is also true voters can potentially catch a change in
2 the human readable text attack; right?

3 A. They potentially can.

4 Q. Let's talk a little bit more about the Bash Bunny
5 installation video.

6 Just to be clear, that method can install malware on a
7 single BMD at a time; right?

8 A. Yes. That is right.

9 Q. And if that kind of attack occurred in a precinct, it
10 would require poll workers not noticing a voter manipulating a
11 BMD; right?

12 A. Well, yes. Although that -- as I discussed yesterday, the
13 voter could block the view of the screen. People often do that
14 while they are voting just for their own privacy.

15 Q. And we all watched. The screen went black. It changed.
16 A number of things happened on the screen during the Bash Bunny
17 installation; is that fair to say?

18 A. Yes.

19 Q. And you're aware there are claims in this case that the
20 screens on the Dominion equipment are so large and bright that
21 they cannot afford voter privacy; right?

22 A. I'm not sure.

23 Q. But it is your belief that a voter is able to shield the
24 screen both for their own privacy and for purposes of
25 installing malware?

1 **A.** Perhaps not all voters are able to do that. But if the
2 voter is a physically large person and takes -- makes an effort
3 to shield the screen, I believe they would be able to.

4 **Q.** Going to our insider or dishonest election worker
5 installation, the machine would need to be booted up, not just
6 stored in a warehouse to make the installation of the software;
7 right?

8 **A.** Yes, it would need to be turned on.

9 **Q.** And you would agree that insiders or intruders could also
10 install malware on the ICP precinct scanners if they were given
11 access; right?

12 **A.** That is likely to be true. But I haven't done the kind of
13 study of the ICP that would allow me to tell you how easily
14 that could be done or whether it poses the same magnitude of
15 threat.

16 **Q.** And you agree that county election offices have security
17 cameras; right?

18 **A.** Yes, at least in some counties.

19 **Q.** I want to talk next about the remote installation method
20 you discussed yesterday.

21 That involves access to the election management server; is
22 that correct?

23 I'm sorry. Election management server or the process for
24 creating election projects; right?

25 **A.** It requires -- it involves -- it involves manipulating

1 data that is passing through those. So it could be physical
2 access or it could be another mode of doing that, yes.

3 **Q.** And do you know if the EMS -- Dominion EMSs would still be
4 used if Georgia used a hand-marked paper ballot system?

5 **A.** Presumably they would be. But in a hand-marked paper
6 ballot system with sufficient audits at the other end, you are
7 able to detect the kinds of -- you are able to detect any kind
8 of manipulation of those results. So the import of such an
9 intrusion would be -- would be dramatically less.

10 **Q.** But again, you can't quantify what the degree of less risk
11 would be; right?

12 **A.** I'm not offering a specific number.

13 **Q.** And -- okay.

14 Do you know if Dominion still builds ballots for Georgia
15 elections?

16 **A.** I believe that function now is being performed in house by
17 the Center for Election Systems.

18 **Q.** Do you know which entity in Georgia is responsible for
19 physical security of the EMS?

20 **A.** I don't know which entity has that responsibility, no.

21 **Q.** And you would agree that an attacker with access to a
22 county's EMS could also affect elections conducted using only
23 hand-marked paper ballots; right?

24 **A.** Again, in a hand-marked system, the effect of such an
25 intrusion, assuming that the ballots are well audited on the

1 other end, could be detected and corrected.

2 In the current system it is possible that it wouldn't be
3 detected at all and it would be likely impossible to correct.

4 **Q.** But you don't know for certain that an attack could be
5 detected in a hand-marked paper ballot system either; right?

6 **A.** Well, it depends what the attack aimed to do. If it aimed
7 to alter the results of the election and change the outcome,
8 then it could be detected reliably by a risk-limiting audit
9 targeting that contest.

10 **Q.** But again, there would have to be a sufficiently rigorous
11 audit to detect that attack; right?

12 **A.** Yes. You need to do sufficiently rigorous audits to
13 detect attacks in general.

14 **Q.** So just to be clear, it is not just the hand-marked paper
15 ballot component? It is also that coupled with a sufficiently
16 rigorous audit in your analysis; right?

17 **A.** Yes. You need both in order to satisfy.

18 **Q.** You would agree that one way to mitigate risks of the
19 Stuxnet style attack you discussed yesterday would be used --
20 to use CDs that write once instead of USB sticks; is that
21 right?

22 **A.** Not necessarily, no.

23 **Q.** Would there be any reduction of risks by using CDs instead
24 of USB sticks for deployment of election materials?

25 **A.** That would be hard to quantify. I'm not sure.

1 Q. Dr. Halderman, your report doesn't offer opinions about
2 the feasibility of particular attacks, just that they can
3 happen; right?

4 A. I'm sorry? I'm not sure I understand your question.

5 Q. Your report identifies attacks that could happen to the
6 election system --

7 A. Yes.

8 Q. -- but doesn't identify the feasibility of those attacks;
9 is that right?

10 A. I'm not sure that I understand the distinction you're
11 trying to draw.

12 Q. You would agree that to be a threat to an election a
13 potential attack has to be something someone can carry out in
14 reality; right?

15 A. The attacks that I say are potential risks are ones that I
16 believe could be carried out in reality.

17 Q. Okay. Do you agree that the degree of technical skill
18 necessary to implement an attack is part of determining whether
19 that attack is feasible?

20 A. Yes, I would agree with that.

21 Q. And you didn't document the degree of technical skills
22 necessary for the attacks in your report; right?

23 A. I wouldn't say that. I talk about, several times in the
24 report, necessary technical skills. Frankly -- frankly, all of
25 the technical work that underlies the attacks in this report

1 isn't exactly the most technical sort of attack. It is
2 software development that happens today. This is maybe people
3 with a computer science background. Like many, many students
4 that I graduate -- that Michigan graduates every year would be
5 perfectly capable of doing it.

6 **Q.** Do you agree that the time necessary to successfully
7 achieve an attack is part of whether an attack is feasible?

8 **A.** Yes.

9 **Q.** Do you agree that the ease with which an attacker can
10 evade discovery through observation or audit is part of
11 considering feasibility of an attack?

12 **A.** Yes.

13 **Q.** Do you agree that the measurement of an ability to attack
14 to affect enough ballots to impact the outcome of an election
15 is part of considering feasibility?

16 **A.** Yes.

17 **Q.** Okay. And your report doesn't discuss how to affect the
18 number of ballots needed for specific elections; right?

19 **A.** What do you mean for specific elections?

20 **Q.** Your report doesn't consider how to affect or determine
21 the number of ballots an attacker would need to alter to change
22 the outcome of a specific election; right?

23 **A.** My report doesn't -- my report doesn't do that because
24 that depends on the margin of victory in a particular election.
25 And the concern in this case is future elections for which the

1 margin of victory is not yet known.

2 **Q.** And you're aware of criticisms of your report as finding
3 the vulnerabilities you identified were not feasible to
4 exploit; right?

5 **A.** I'm not sure which criticisms you are referring to.

6 **Q.** Are you familiar with MITRE's criticism of your report?

7 MR. ANDREU-VON EUW: Objection, Your Honor. The
8 Court has ruled on this.

9 MR. TYSON: Your Honor, Dr. Halderman said he wasn't
10 sure what criticisms of his report of feasibility. I was
11 offering this for purposes of impeaching and exploring this
12 line of questioning with him.

13 THE COURT: Well, the report itself is not
14 substantive evidence in the case. But I think he's entitled to
15 ask whether -- about it unless you can explain to me why,
16 sir -- why he shouldn't be able to ask him that.

17 MR. ANDREU-VON EUW: He can ask about criticism. He
18 can't introduce through his questions or otherwise the report
19 into evidence.

20 THE COURT: Well, he's not -- I don't think he is
21 going to do that.

22 MR. TYSON: I was going to ask regarding his
23 awareness of the report and what the allegations were in the
24 report.

25 THE COURT: All right. Well, that is something

1 different. I'm not allowing you to do that but -- given the
2 status of the report and that it is -- and all the issues I
3 described before.

4 If you want to ask him about the subject matter or
5 the criticism detached from that, you're welcome to do that.

6 MR. TYSON: Thank you, Your Honor.

7 BY MR. TYSON:

8 Q. Dr. Halderman, are you aware of a report by MITRE that
9 criticized your report?

10 MR. ANDREU-VON EUW: Same objection, Your Honor.

11 THE COURT: All right. Just -- you can ask that.
12 But you cannot go further -- I mean, you can ask about the
13 particular issue. But you cannot then engage about it and
14 start introducing evidence. I mean -- all right.

15 MR. TYSON: And, Your Honor, to be clear, that's why
16 I asked if he was aware of the report criticizing his report.
17 That is the question.

18 THE COURT: That's fine.

19 THE WITNESS: Yes.

20 BY MR. TYSON:

21 Q. And I'm assuming you disagree with that report; right?

22 MR. CROSS: Your Honor, it is just an end-run around
23 Your Honor's ruling.

24 THE COURT: Right. No. We're not going there.

25 MR. TYSON: Okay.

1 THE COURT: We're not going there. I mean, if you
2 want -- how you started I understood. If you want to say
3 that -- have there been -- how do you address a particular
4 issue, that is one thing. Is this a problem? Explain it and
5 then he can address it.

6 MR. CROSS: Your Honor, we would move to strike the
7 reference to the testimony regarding the report.

8 MR. TYSON: Your Honor, I think we're entitled to at
9 least have the answer about his awareness of the report, if
10 nothing else.

11 THE COURT: Yes. I think you are.

12 Are you aware of the report?

13 THE WITNESS: Yes.

14 THE COURT: All right.

15 MR. TYSON: And with that, at Your Honor's direction,
16 we'll change topics then.

17 BY MR. TYSON:

18 **Q.** Dr. Halderman, you also address ballot scanners, the ICP
19 units in your report; correct?

20 **A.** I did some limited amount of analysis of the ICP.

21 **Q.** And you would agree that the Dominion ICP scanner can be
22 used with a hand-marked paper ballot system; right?

23 **A.** Yes.

24 **Q.** And any of the vulnerabilities you identified concerning
25 ICPs would apply if Georgia used a hand-marked voting system

1 and not a BMD-based voting system; correct?

2 **A.** The vulnerabilities with the ICP identified in my
3 report -- I'm trying to remember exactly which ones they
4 identified in the ICP in my report.

5 **Q.** I'm happy to ask you about them specifically if you would
6 like me to.

7 **A.** Yes. Please ask me about them specifically.

8 **Q.** If Georgia used a hand-marked paper ballot system, the
9 vulnerability of the scanner accepting photocopied ballots
10 would still apply; right?

11 **A.** Yes. Well, sort of. Sort of. Because the photocopied
12 ballot -- a photocopied ballot of -- a photocopy of a
13 hand-marked paper ballot is going to be obvious. Anyone who is
14 inspecting the ballots, a photocopy of a BMD ballot is going to
15 look just like a BMD ballot that came out of the printer
16 potentially.

17 **Q.** But you haven't tested that with the ICP scanners to see
18 if it treats a photocopied hand-marked ballot differently than
19 an actual hand-marked ballot?

20 **A.** No, I haven't tested that.

21 **Q.** If Georgia used a hand-marked paper ballot system with
22 Dominion ICP scanners, the vulnerability would still exist if
23 accessing ballot images in order; correct?

24 **A.** Yes, that would.

25 **Q.** And you would agree that it is possible that a bad actor

1 could install malware on a Dominion ICP scanner to make it
2 incorrectly count hand-marked paper ballots; right?

3 **A.** Yes, I think it is possible. I don't have -- unlike the
4 ICX, I can't say that that would be easy or more difficult.

5 The attack surface of the ICP is much less. And you
6 likely can't just walk up to an ICP as a voter on election day
7 and install malware. Though other vulnerabilities may exist.

8 **Q.** Did you raise concerns in December 2020 regarding
9 hacking --

10 THE COURT: All right. Is this a new subject?

11 MR. TYSON: It is, Your Honor.

12 THE COURT: Okay. I'm going to stop at this moment
13 because I have a phone conference in another case that is
14 sensitive at 12:30. So I think it is a good time to stop if
15 you are on a new subject.

16 MR. TYSON: Certainly. I'm near the end, Your Honor,
17 but I do have a couple of more things to cover.

18 THE COURT: Go ahead.

19 MR. TYSON: Not in seven minutes. I'm sorry. Yeah.

20 THE COURT: Hope springs eternally, because I would
21 have told them we were going to get out -- we are running
22 five minutes or ten minutes late.

23 That is not a possibility?

24 MR. TYSON: I don't think so, Your Honor.

25 THE COURT: How much more time do you think you have?

1 MR. TYSON: I'm thinking probably 15 minutes. It is
2 not much more. But I'm not sure. If Dr. Halderman will agree
3 with all of my answers, it would go very quickly obviously.

4 THE COURT: That is the answer to all things, isn't
5 it? Agreement.

6 All right. Okay. Well, we'll take -- we'll take --
7 go ahead and take the break since I have already used two and a
8 half minutes just chatting about it.

9 I'll see you-all at 1:20 because I don't think I can
10 be through sooner.

11 MR. TYSON: Thank you, Your Honor.

12 THE COURT: All right.

13 COURTROOM SECURITY OFFICER: All rise.

14 **(A lunch break was taken.)**

15 THE COURT: You may proceed.

16 MR. TYSON: Your Honor, I did want to clarify one
17 point at the beginning.

18 Regarding the MITRE report, your ruling was that I
19 can't ask any questions that get into the substance; is that
20 correct?

21 THE COURT: Right.

22 MR. TYSON: So, for example, asking whether
23 Dr. Halderman was aware of whether MITRE used a threat model
24 assessment you would consider not an appropriate question; is
25 that right?

1 THE COURT: I think that is the content.

2 MR. TYSON: I just wanted to verify.

3 THE COURT: Yeah.

4 MR. TYSON: Thank you, Your Honor.

5 BY MR. TYSON:

6 **Q.** Dr. Halderman, do you recall raising concerns in December
7 of 2020 about whether the Dominion equipment could be hacked by
8 loading malware on a machine that could then spread across the
9 system via the EMS?

10 **A.** Raising concerns to whom?

11 **Q.** To the Court or to your counsel.

12 **A.** Yes, I did raise concerns.

13 **Q.** And were you concerned about the potential impact of that
14 vulnerability on the January 2021 Senate elections?

15 **A.** Yes, I was.

16 **Q.** And was that request acted on, to your knowledge?

17 **A.** My recollection is that -- my recollection is that counsel
18 attempted to communicate with the Court to -- to see whether it
19 would be possible to raise the issues outside of the protective
20 order.

21 But at this time, we were operating under the -- because
22 we were operating under the protective order, it was unclear
23 whether the -- whether and to whom the findings could be
24 communicated.

25 **Q.** And are the concerns you had in December 2020 one of the

1 vulnerabilities you discussed in your report?

2 **A.** Can you repeat the question, please, Mr. Tyson?

3 **Q.** Certainly. Are the concerns that you raised in December
4 of 2020 -- are those included in your report as one of the
5 vulnerabilities you identified?

6 **A.** Yes. The concern was the vulnerabilities that I had
7 identified. By that time, many or most of the vulnerabilities
8 in the report were ones we were aware of.

9 **Q.** And you're aware that two democratic U.S. senators were
10 elected in January of 2021; right?

11 **A.** Yes.

12 **Q.** And you don't have any evidence that the result of the
13 January 2021 runoffs were compromised in any way; right?

14 **A.** No, I don't have any evidence of that.

15 **Q.** Now, Dr. Halderman, you have examined forensic images of
16 the Coffee County server and other Coffee equipment taken by
17 SullivanStrickler and did not find any malware; correct?

18 **A.** No, I didn't find any malware.

19 **Q.** Okay.

20 **A.** That was from before -- those images would be before
21 SullivanStrickler and the other people in Coffee County had
22 interacted with the equipment; right? This is a snapshot at a
23 point in time.

24 And the -- I have never had an opportunity to examine the
25 voting equipment in Coffee County, even after the State took it

1 out of use over the security concerns stemming from Coffee
2 County.

3 THE COURT: Could I just ask you a question.

4 You said, no, I didn't find any malware.

5 That was from before those images -- would be before
6 SullivanStrickler and the other people in Coffee County had
7 interacted with the equipment.

8 So what you were seeing was images that would have
9 predated whatever SullivanStrickler and other people did to
10 interact with the equipment?

11 THE WITNESS: Excuse me, Your Honor. You raised a
12 good point that I did later get to see a second image from
13 Coffee County that was collected after the State had imaged it.
14 That was very long in the future, and the computer had been,
15 well, frankly, through a lot since that time.

16 So while we were able to learn some things about what
17 had happened during the Coffee intrusion from that, it is
18 wholly possible that other evidence was lost.

19 THE COURT: All right. And that actually wasn't my
20 question, but that is fine because I wasn't aware of --
21 completely of the timing.

22 But all I'm asking is, is that at the first point
23 that you were able to look at the Coffee County equipment, at
24 that point -- is it -- I just want to understand.

25 Was it that SullivanStrickler had worked with the

1 software at that point or had not yet, or it was predating
2 that?

3 THE WITNESS: It was the image that they had
4 collected, that SullivanStrickler themselves had collected. So
5 it would not have had any effect of the things that they did.

6 THE COURT: Afterwards?

7 THE WITNESS: Yes.

8 THE COURT: All right. I got it. Thank you.

9 BY MR. TYSON:

10 Q. And, Dr. Halderman, you have opined that the Coffee County
11 intrusion materially increases the risk to Georgia elections;
12 is that right?

13 A. Yes.

14 Q. And like the other things we have discussed, you don't
15 have a method for quantifying the degree of risk that changed;
16 right?

17 A. No. As we have discussed, it makes -- it would make
18 attacking the system significantly easier in some ways, but I
19 don't -- I'm not offering up a number on that.

20 Q. And you've also raised the issue of the Secretary in one
21 of your reports or your supplemental Rule 26 report not
22 inspecting that equipment.

23 Do you recall that?

24 A. Yes.

25 Q. You would agree that even if the Secretary had inspected

1 the equipment, it wouldn't necessarily show if malware was
2 installed because the malware could have deleted itself; right?

3 **A.** Yes.

4 **Q.** You also identified vulnerabilities in the EMS and the
5 central count scanner related to Windows security updates;
6 right?

7 **A.** Yes.

8 **Q.** And those -- are those the same missing Windows security
9 updates that you discussed in your report on the Antrim County,
10 Michigan, system?

11 **A.** I'm not sure I verified whether they are the same set of
12 updates that are missing.

13 **Q.** But fair to say it would require EAC approval to install
14 additional security updates on the EMS and have the system
15 remain certified; right?

16 **A.** That is true. Although the process for that -- I have had
17 discussions with people at EAC to understand their process, and
18 they have told me that they would welcome and quickly approve
19 updates submitted by Dominion, but Dominion hasn't submitted.

20 MR. TYSON: And, Your Honor, I realize experts can
21 rely on hearsay, but that's not included in Dr. Halderman's
22 reports, and I would move to strike that last answer regarding
23 the hearsay on what EAC members have told him about Dominion.

24 MR. ANDREU-VON EUW: It is responsive to the
25 question.

1 Your Honor, the answer was responsive to the question
2 posed by Mr. Tyson.

3 THE COURT: It won't be on the record if you start
4 whispering.

5 MR. ANDREU-VON EUW: Your Honor, the question was
6 responsive to the question Mr. -- excuse me. The answer was
7 responsive to the question Mr. Tyson asked, and experts are
8 allowed to rely on hearsay.

9 THE COURT: Well, I think he was responsive to the
10 question about what he knows, but it doesn't mean -- I won't
11 consider it for the truth of whatever EAC actually represented
12 to him.

13 MR. TYSON: Thank you, Your Honor.

14 BY MR. TYSON:

15 **Q.** Dr. Halderman, yesterday, do you recall testifying about
16 jurisdictions across the country that used BMDs for all
17 in-person voters?

18 **A.** No. I testified about jurisdictions that used BMDs as the
19 primary method of voting.

20 **Q.** And you relied on the Verified Voting website for your
21 information on that point; right?

22 **A.** Yes. Verified Voting maintains the most detailed public
23 national database of this sort of information.

24 **Q.** Do you recall across the country what the percentage of
25 registered voters live in jurisdictions that use BMDs as the

1 primary method of voting?

2 **A.** Verified Voting doesn't give that number. They give a
3 related number which is the percentage of voters who live in
4 jurisdictions where BMDs are the primary in-person method.

5 That significantly overcounts BMD usage because it
6 includes jurisdictions in certain large states that are
7 predominantly mail-in, such as California.

8 **Q.** And do you recall, again, what the percentage is on the
9 Verified Voting website regarding jurisdictions that use BMDs
10 as their primary method of voting?

11 **A.** Again, that's not the number that Verified Voting gives.
12 They give the percentage of registered voters who live in
13 jurisdictions for the primary in-person method, not the primary
14 method of voting.

15 **Q.** I apologize for the lack of precision in my question.

16 Do you recall what the percentage is on the Verified
17 Voting website for registered voters who live in jurisdictions
18 where BMDs are the primary method of voting for in-person
19 voters?

20 **A.** I don't recall exactly.

21 **Q.** If you could review the website, would it refresh your
22 recollection?

23 **A.** Sure.

24 MR. TYSON: May I approach, Your Honor?

25 THE COURT: Yes.

1 BY MR. TYSON:

2 **Q.** Dr. Halderman, I have handed you a copy of the Verified
3 Voting website.

4 I'm not moving to admit this, but does this refresh your
5 recollection regarding my question?

6 **A.** Yes. Thank you.

7 So the number Verified Voting lists is 22.7 percent. But
8 as you can see from this map, that includes enormous
9 jurisdictions, such as places in Southern California where BMDs
10 are not, in fact, the primary method of voting. But
11 approximately 90 percent of people in those jurisdictions vote
12 by mail, but 100 percent of people who live there are counted
13 as part of this BMD fraction.

14 **Q.** And you indicated earlier you do some work with the
15 Louisiana Secretary of State; is that right?

16 **A.** Yes.

17 **Q.** And Louisiana still uses DREs; correct?

18 **A.** They are working very hard to get rid of them.

19 **Q.** And South Carolina uses BMDs for in-person voters as the
20 primary method of voting; right?

21 **A.** South Carolina does, yes. They are ES&S BMDs.

22 **Q.** And Arkansas used BMDs for a large portion of its voters
23 who vote in person; right?

24 **A.** Many Arkansas counties do. Again, they are not the ICX
25 BMD; they are another manufacturer.

1 Q. And a significant portion of Texas voters use BMDs as
2 their primary method of voting for in-person voting; right?

3 A. So that's true. Although in Texas, the ICX would be
4 illegal because it was reviewed by Texas' state certification
5 board and rejected, I believe, multiple times.

6 Q. And so yesterday when you testified about the use of
7 Dominion BMDs for voters that vote in person in seven counties
8 outside of Georgia, you weren't saying that BMDs that use
9 barcodes on the printed ballots is only used by seven counties
10 outside Georgia; right?

11 A. No. I was talking about the specific BMD that is the
12 subject of my report.

13 Q. And the ES&S ballot-marking devices that are available
14 today use barcodes; right?

15 A. The ES&S ones do. There is a third manufacturer that does
16 not.

17 THE COURT: Who's that?

18 THE WITNESS: That is Hart InterCivic.

19 BY MR. TYSON:

20 Q. So, Dr. Halderman, you testified as an expert in some
21 other cases; right?

22 A. I have.

23 Q. And one of those cases was in Pennsylvania; correct?

24 A. Yes.

25 THE COURT: Before we do this, let me just clarify

1 about the Los Angeles testimony.

2 THE WITNESS: Please.

3 THE COURT: So 90 percent of the people in the county
4 of Los Angeles use mail-in ballots, but the Verified Voting
5 reports it as 100 percent?

6 THE WITNESS: Yes. It is a limitation to their
7 methodology here. This is -- their election day equipment is
8 covering in-person voting only, so those percentages are just
9 election day in person, but it is a percentage of all of the
10 registered voters that is included in that sum.

11 THE COURT: And is that -- so they are reporting all
12 voters, including the large bulk of people who are voting --

13 THE WITNESS: By mail.

14 THE COURT: -- by mail?

15 THE WITNESS: Yes. And for Los Angeles County, which
16 has a population that must be a substantial fraction of the
17 population of Georgia, about 90 percent of those people are
18 voting by mail. So it skews the numbers a bit in favor of
19 ballot-marking device usage.

20 THE COURT: I see.

21 And are there other places that have that same major
22 anomaly?

23 THE WITNESS: Are there other places -- elsewhere in
24 California? As you can see, some of the very populous Southern
25 California counties are marked this way. I think San Diego,

1 California, for instance, is listed as a BMD jurisdiction, but
2 I believe they have gotten rid of polling places altogether and
3 just have a few vote centers for the residual fraction of
4 people who are voting in person.

5 THE COURT: Okay. All right.

6 BY MR. TYSON:

7 Q. So just to clarify, Dr. Halderman, in Los Angeles County,
8 California, voters have a choice to either vote by mail early
9 or to vote in person on a BMD; is that right?

10 A. That is right.

11 Q. And in Georgia, voters can vote by mail with no excuse
12 required; right?

13 A. I believe that is still the case.

14 Q. So moving back to our discussion of Pennsylvania, you
15 testified as an expert for Jill Stein's campaign; is that
16 right?

17 A. Yes.

18 Q. Who is Ms. Stein?

19 A. Ms. Stein was a third-party candidate running for
20 president. I think she was the Green Party candidate that
21 year.

22 Q. And in the 2016 election, the Clinton campaign did not
23 seek a re-count, but Ms. Stein did; is that right?

24 A. She sought re-counts in some jurisdictions.

25 Q. And the case that was brought in Pennsylvania alleged that

1 voting machines were not sufficiently secure against a cyber
2 attack; is that right?

3 **A.** Yes.

4 **Q.** And that is the same issue in this case, to your
5 understanding; right?

6 **A.** I think the issues in this case are quite different. It
7 is not -- that case was about a specific election outcome.

8 **Q.** But in the Pennsylvania case, there were allegations that
9 the machines were not sufficiently secured against an attack,
10 and that is similar to this case; right?

11 **A.** Yes, I suppose it is similar in some ways.

12 **Q.** And there was ultimately no evidence that any attack had
13 been performed against any equipment in Pennsylvania during an
14 actual election; right?

15 **A.** Yes.

16 **Q.** And the equipment in Pennsylvania involved a printed
17 record from a voting machine that included human readable text
18 and a barcode; right?

19 **A.** Some of it did, and some of it didn't.

20 **Q.** And you offered an opinion in that case that the machines
21 in Pennsylvania were subject to a potential cyber attack;
22 right?

23 **A.** Yes.

24 **Q.** And you testified that a hacker could add malware to
25 machines so the Pennsylvania equipment would have text that

1 didn't match the barcode; right?

2 **A.** I don't recall, but if you say so.

3 **Q.** Did you recall also testifying that a hacker could change
4 both the barcode and the text on the machines at issue in
5 Pennsylvania?

6 **A.** I don't have my testimony in front of me, but I -- I don't
7 have my testimony in front of me.

8 **Q.** The judge in that case found your testimony wasn't
9 helpful; right?

10 **A.** Yes.

11 **Q.** And, in fact, the judge found that you were not credible;
12 correct?

13 **A.** Yes.

14 **Q.** And the judge said you acted more like an advocate than an
15 expert; right?

16 **A.** Yes.

17 **Q.** And the judge admonished you while you were on the stand.
18 Do you recall that?

19 **A.** Yes.

20 **Q.** And the judge in that case found the lack of any hacking
21 or -- or manipulation in an actual election rendered your
22 opinions dubious; right?

23 **A.** I don't have his findings in front of me, but if you say
24 so.

25 **MR. TYSON:** May I approach, Your Honor?

1 THE COURT: Yes.

2 I'm not sure what the value in a bench trial is of
3 having the witness read the testimony -- the judge's findings
4 when I have already read the decision and can read it again.
5 You've raised it. It is not useful. It doesn't seem useful,
6 but I'll let you go forward, but don't go much further.

7 MR. TYSON: Thank you, Your Honor.

8 BY MR. TYSON:

9 Q. Dr. Halderman, I have handed you what we have marked as
10 1228. If you could turn to Page 16 of that document, second
11 full paragraph in the middle: Yet Halderman never raised this
12 dubious suggestion in his written feedback presumably because
13 it is incorrect.

14 And that related to some of your opinions and reports in
15 that case; right?

16 THE COURT: I think that is way too complex. I don't
17 know what the dubious -- at this point what he is referring to,
18 and it is not fair to the witness to ask him about what was
19 deemed dubious unless we're going to go through -- piece by
20 piece through a very long 27-page opinion.

21 BY MR. TYSON:

22 Q. Dr. Halderman, the judge found the lack of any hacking or
23 actual -- I'm sorry.

24 The judge found there was no evidence of hacking or
25 manipulation in an actual election in the Stein case; right?

1 **A.** Yes.

2 **Q.** And you have no evidence of hacking or manipulation in an
3 actual election in this case either?

4 **A.** Yes.

5 **Q.** Dr. Halderman, yesterday you testified about chaos in the
6 election system.

7 Do you recall that?

8 **A.** I do.

9 **Q.** And you would agree that if a bad actor wanted to sow
10 chaos in elections, there are far more low-tech ways to do that
11 than launching a manipulation of software; right?

12 **A.** Well, for example?

13 **Q.** Someone could firebomb a precinct; right?

14 **A.** I think that would -- that would sow chaos, but that would
15 not make people doubt the results of all of the other votes the
16 way that the things I discussed yesterday would.

17 **Q.** Someone could smash a BMD with a hammer; right?

18 **A.** Again, that wouldn't cast doubt on the results of the
19 entire election; that would just cause a small delay until they
20 found other equipment or reverted to their emergency paper
21 ballots. It is not at all the same thing.

22 **Q.** So, in your opinion, sowing chaos in an election doesn't
23 mean preventing people from voting? It means changing the
24 outcome of an election?

25 **A.** It means undermining the premise that the -- that the

1 belief that the election is fair and has produced a credible
2 result. It means making people doubt that their own votes have
3 been recorded correctly or that the outcome is legitimate. It
4 doesn't mean simply causing a small delay.

5 **Q.** So in your estimation, trust in elections involves voters
6 having confidence that their ballots are counted as they
7 intended them to cast; is that right?

8 **A.** That is certainly an important part of it.

9 **Q.** So, Dr. Halderman, it is your belief that every Georgia
10 voter has a substantial reason to doubt their vote is going to
11 be counted correctly when it is cast in an ICX; right?

12 **A.** Yes, unfortunately. There's no evidence -- I would say
13 there is no evidence that there has been such fraud in the
14 past. But in the future, I think there is -- I think the
15 findings that I presented yesterday that CISA has validated,
16 the demonstration we just saw -- I mean, is that not reason to
17 have concern and doubt? Unfortunately, it is.

18 **Q.** And as an expert, you can't rule out that potential
19 attacks on the ICX affected past elections in Georgia; right?

20 **A.** I'm not offering an opinion on that.

21 **Q.** But you can't rule it out; right?

22 **A.** I'm not offering an opinion on past elections in this
23 case.

24 **Q.** Your testimony, you said, was about future elections;
25 right?

1 **A.** Yes.

2 **Q.** And do you recall in the 2020 election comparing Georgia's
3 election -- I'm sorry.

4 Do you recall prior to the 2020 election comparing
5 Georgia's election system to the 737 MAX aircraft?

6 **A.** I do.

7 **Q.** Looking at the future election of 2024, do you still
8 believe Georgia's election system, if nothing changes, is the
9 737 MAX?

10 **A.** I believe my testimony was that the -- applying the
11 software update in the fall of 2020 raised risks similar to --
12 I made an analogy to the 737 MAX, and that risk that I
13 highlighted that a -- I think was borne out.

14 **Q.** And you can't rule out the possibility that real attacks
15 would go undetected in future elections if Georgia doesn't
16 change its voting system; right?

17 **A.** No, I can't rule that out.

18 **Q.** And you would agree that people who say Georgia's election
19 system is not safe and reliable have a reasonable basis for
20 making that statement; right?

21 **A.** Yes. That doesn't make every claim about elections
22 correct. But as a risk assessment based on the real
23 vulnerabilities that CISA has validated, it is unfortunately --
24 it is unfortunately so.

25 **Q.** And it is your belief that voters have a rational reason

1 to doubt the results of the 2024 presidential election in
2 Georgia if it is conducted on a Dominion ICX under the current
3 system; right?

4 MR. ANDREU-VON EUW: Objection, Your Honor. This was
5 ruled on yesterday, and it is beyond the scope of his report.

6 MR. TYSON: Your Honor, I believe it goes to bias, to
7 what Dr. Halderman's credibility --

8 THE COURT: I have allowed you to go in depth into
9 issues of bias. This is beyond bias. This is about trying to
10 pursue a different line of questions which I have addressed
11 before. Thank you.

12 BY MR. TYSON:

13 Q. Dr. Halderman, yesterday you said not all voting machines
14 can be hacked with a pen; right?

15 A. Yes.

16 Q. You would agree that a hand-marked paper ballot can be
17 modified with a pen; right?

18 A. Not after it has been fed into an optical scanner because
19 you have a digital record of what it said that you can compare
20 to the paper ballot.

21 Q. But for an absentee ballot that is received, it can be
22 modified before it is fed into a scanner by an insider; right?

23 A. That is true.

24 Q. And that would be with a pen?

25 A. That is true.

1 Q. So you would agree that a hand-marked paper ballot system
2 can also be hacked with a pen?

3 A. But we're talking -- no, so -- and you are comparing
4 apples to oranges. There are different threats that face
5 mail-in ballots than in-person ballots, and a modern
6 precinct-based optical scan system greatly reduces any risk
7 from insiders modifying ballots because you have a digital
8 record of the ballot contemporaneous with the voter putting it
9 in the machine.

10 MR. TYSON: So, Your Honor, at this time I need to
11 consult my co-counsel briefly if I could.

12 THE COURT: Sure.

13 **(There was a brief pause in the proceedings.)**

14 BY MR. TYSON:

15 Q. Dr. Halderman, you agree that the Dominion ICP scanner
16 also has the potential of being hacked; right?

17 A. I haven't undertaken a detailed study of the ICP scanner
18 to be able to tell you if that would be easy or hard.

19 But does it have the potential? Potentially.

20 THE COURT: Did you ask about the ICP or the ICX?

21 MR. TYSON: ICP.

22 THE WITNESS: Once again, that is why it is so
23 important to have -- even if the ICP is hacked, if the records
24 that were scanned on the ICP were hand-marked voter ballots,
25 then we could be sure that any modification would be detected

1 in a risk-limiting audit or a re-count and we could correct the
2 problem.

3 You don't have that with the system you have now,
4 Mr. Tyson.

5 BY MR. TYSON:

6 **Q.** And to be clear, that's only if there is a re-count of the
7 race involved and if there was a sufficiently rigorous audit;
8 right?

9 **A.** Yes.

10 **Q.** And not if the ballots were modified after the fact; is
11 that right?

12 **A.** If the ballots -- if the ballots were modified after the
13 fact, you could -- you mean -- you mean to conceal the hacking?

14 **Q.** Conceal the hacking or to sow further confusion about the
15 result.

16 **A.** Well -- so it would be enormously difficult to hack a
17 hand-marked precinct counted system and also go in and modify
18 the ballots in a way that would escape detection in a rigorous
19 comparison of the two. You would need both a high-tech
20 conspiracy and a large conspiracy on the ground of people who
21 would modify the ballots in a way that agreed.

22 That is a world of difference from what we're talking
23 about with the BMD system.

24 MR. TYSON: So, Your Honor, at this time, that
25 concludes my questions for Dr. Halderman. I had a couple --

1 MR. CROSS: Your Honor --

2 MR. TYSON: I'm sorry.

3 MR. CROSS: That's all right.

4 Before Mr. Tyson does that, I just wanted to come
5 back and clarify one thing so the record is clear. On the
6 MITRE report, Mr. Tyson asked you at the top of -- when we came
7 back from the break, so, for example, asking whether
8 Dr. Halderman was aware of whether MITRE used a threat model
9 assessment you would consider not an appropriate question.

10 Just to be clear, we don't have an objection to him
11 asking questions about the same sort of concerns or findings
12 which he has covered actually in great detail with questions
13 about whether he considered physical access to the equipment,
14 access controls, RLAs, the types of things discussed in the
15 report.

16 But I would have no objection to him asking, for
17 example, do you believe that any of the attacks discussed in
18 your report are operationally infeasible? Are there any
19 attacks that you believe are non-scalable?

20 And so I just -- to be very transparent, I want to
21 protect the record on appeal. Our objection is then bringing a
22 report in and then trying to offer that as expert testimony in
23 some rebuttal way. Your Honor has ruled on that.

24 But there is nothing that we're opposing that says
25 from anywhere they want to get it. If they want to search the

1 internet and find somebody that says Dr. Halderman is wrong,
2 while they can't talk about that specifically, he can extract
3 the substance of that and just ask Dr. Halderman, have you
4 considered this? Have you considered that?

5 And so if he wants to do that with the MITRE report
6 or anything else, we --

7 THE COURT: I thought that is what he was doing --

8 MR. CROSS: That is where we thought he was going.

9 THE COURT: -- that you were doing. And to the
10 extent if I blocked you from the doing same as to information
11 you wish to pursue without reference to the MITRE report, if
12 you felt like there was nothing I blocked you from, yes, you
13 can proceed, but I thought you had done this in great detail as
14 it was.

15 MR. TYSON: Your Honor, if I could just have a moment
16 to consult on that. I want to make sure my notes are clear on
17 that point, if I could.

18 THE COURT: All right.

19 MR. TYSON: Thank you.

20 **(There was a brief pause in the proceedings.)**

21 MR. TYSON: Thank you, Your Honor.

22 THE COURT: Do you have more questions?

23 MR. TYSON: I do.

24 BY MR. TYSON:

25 Q. Dr. Halderman, in your report, did you consider the

1 difficulty necessary to implement each of the attacks or the
2 vulnerabilities that you have identified in your report?

3 **A.** Yes, I did.

4 **Q.** Did you consider the time required for each vulnerability?

5 **A.** Yes.

6 **Q.** Did you include --

7 THE COURT: The time required for each vulnerability?
8 You mean to attack each vulnerability?

9 MR. TYSON: To attack, yes, Your Honor.

10 THE COURT: Thank you.

11 BY MR. TYSON:

12 **Q.** You did not include in your report, though, an opinion
13 about the feasibility beyond that it can be done; right?

14 **A.** I think my report does, for these attacks, try to
15 characterize they could be easily done, who could do them. It
16 gives examples of how long things took to implement, which
17 gives you an idea of how long they would take for somebody else
18 to implement them, and none of it required Ph.D.-level
19 technological skills.

20 **Q.** And to be clear, when you assessed the difficulty of
21 engaging in any of these attacks, you didn't consider the
22 difficulty of each step? You considered the difficulty on the
23 attack as a whole; is that right?

24 **A.** It depends on the attack. Some of them would require
25 multiple steps, and I considered the difficulty of each step.

1 Often -- often there really is just not a particularly hard
2 step.

3 Q. So you don't consider it to be a hard step to maintain --
4 to obtain the original election definition file?

5 A. No. Anyone can walk up to any of the voting machines in
6 Georgia and do that with a pen.

7 Q. And in rendering your opinions in this report, you didn't
8 use any sort of threat model assessment, did you?

9 A. Yes. I have a threat model section at the beginning of
10 the report.

11 Q. And those are the threats that you said would apply to
12 Georgia elections regardless of the system that is used; right?

13 A. That is the threat model under which I am assessing the
14 system, that these are the attacks facing the system. That is
15 what a threat model assessment is, is you define a set of
16 attackers, think of -- define what their goals and resources
17 would be, and apply that within the context of a system.

18 MR. TYSON: Let me consult one more time, Your Honor.
19 I'm trying to do this on the fly.

20 THE COURT: All right.

21 **(There was a brief pause in the proceedings.)**

22 MR. TYSON: All right, Your Honor. So with that, I
23 would conclude my questions.

24 A couple of administrative items I did want to cover.
25 First of all, I understand Your Honor's ruling regarding the

1 2020 election questions and the candidates and all that. We
2 wanted to pursue a limited line of questions there inquiring
3 into bias. But I understand your ruling on that.

4 And then I wanted to also formally offer Mr. Persinger's
5 declaration as part of our basis for the Rule 26 objection --
6 the declaration we provided yesterday.

7 THE COURT: Okay. Well, we're working on an order
8 relative to that. I think we had a few questions and we wanted
9 to deal with those in-camera later.

10 MR. TYSON: Certainly, Your Honor.

11 THE COURT: But otherwise, as to the other Rule 26
12 objections to Dr. Halderman's video demonstrative, I'm going to
13 enter this as a written order just so that we kind of -- so I
14 give it to you now so in case it has any significance later on
15 today because I know you're busy here, so I'm just going to
16 read it into the record.

17 During yesterday's proceedings, plaintiffs offered
18 video demonstration of how malware could be installed on a BMD
19 machine through the use of a USB device known as a Bash Bunny.
20 Defendants objected to the use of the video, arguing that it
21 was not properly disclosed under Federal Rule of Civil
22 Procedure 26(a)(2)(B)(iii) as an exhibit used to summarize or
23 support an expert opinion. Specifically, defendants argue that
24 the steps taken in the video regarding particular election file
25 and the particular election used were not included in the

1 report.

2 The parties submitted relevant case law for the Court
3 to review -- which I have and I, in particular, have read all
4 of it -- but we're going to note in particular *United States ex*
5 *rel Morsell v. NortonLifeLock, Inc.*, 2022 WL 28773 at Pages 4
6 through 5, and *Zaukar -- Z-A-U-K-A-R -- v. United States*, 2022
7 WL 198714 at 6 -- Page 6, two district court rulings.

8 After careful consideration, the Court first agrees
9 with plaintiffs that the steps demonstrated in the video to
10 install the malware on the BMD machine were sufficiently
11 outlined in Sections 8.4 and 8.5 of Dr. Halderman's expert
12 report. And Dr. Halderman's live, in-court narration of the
13 steps taken in the video as it played during his testimony
14 followed those outlined in his expert report.

15 The Court also agrees that use of hypothetical
16 elections and candidates in the demonstration video, rather
17 than the elections listed on the real prior Georgia ballot that
18 Dr. Halderman used in drafting his report, does not run afoul
19 of Rule 26. This is just changing the names of the candidates
20 or the events.

21 As plaintiffs explained, the video demonstration was
22 meant to illustrate how, using the steps identified in
23 Dr. Halderman's report, certain vulnerabilities in the BMD
24 system could be exploited to install malware on a BMD machine
25 during a future election.

1 Dr. Halderman testified that, quote, to avoid overly
2 politicizing, end of quote, the demonstration, he thought it
3 would be wise to show how such a malware attack could result in
4 the manipulation of votes for hypothetical candidates rather
5 than real runs in actual past elections.

6 It therefore does not appear that the use of
7 hypothetical elections in candidates in the demonstrative
8 constituted new opinions or supporting data and methodology
9 that were not previously disclosed in his expert report.

10 Thus, the Court is satisfied that the Bash Bunny
11 video was merely a trial demonstrative used by the plaintiffs
12 to show in realtime how this attack method could be used to
13 exploit certain vulnerabilities in the BMD system during an
14 election.

15 Because these vulnerabilities and the steps for
16 executing a Bash Bunny attack were outlined in Dr. Halderman's
17 report, the Court concludes that the video is the type of
18 testimonial aid that merely illustrates or demonstrates an
19 existing expert opinion in the record. Because the video is
20 not itself substantive evidence, it is excluded from Rule 26's
21 pretrial disclosure requirements.

22 The Court also appreciates that the video was
23 provided to defendants days before it was shown at trial,
24 providing defendants time to raise an informed objection and
25 adjust their cross-examination of Dr. Halderman.

1 MR. TYSON: Thank you, Your Honor.

2 So, Your Honor, now that you have ruled on that
3 particular Rule 26 issue and the other issues raised, I just
4 would make the same proffer regarding the political nature that
5 I made at the conclusion of my questions just to preserve that
6 issue, that that was an issue we wished to explore. Thank you.

7 THE COURT: All right.

8 MR. CROSS: Your Honor, on your order, could I ask
9 one clarifying question?

10 THE COURT: Yes.

11 MR. CROSS: The lack of a Rule 26 objection to the
12 equipment, did that also factor into Your Honor's ruling?

13 THE COURT: The lack of Rule 26 objection earlier in
14 the pretrial order?

15 MR. CROSS: In the pretrial order.

16 THE COURT: Well, it is noted. I mean, I think I
17 noted that before issuing this, and I will make sure that the
18 record -- whatever we enter reflects that as well.

19 MR. ANDREU-VON EUW: I just need one second.

20 The end is in sight, Dr. Halderman.

21 THE COURT: So you think. He has been around this
22 bend before.

23 REDIRECT EXAMINATION

24 BY MR. ANDREU-VON EUW:

25 Q. Dr. Halderman, would it be appropriate to assume there are

1 effective access controls to voting equipment without
2 conducting a threat assessment of the underlying voting
3 equipment?

4 **A.** No.

5 **Q.** Okay. Changing topics a little bit.

6 Earlier, most of yesterday, you were asked some questions
7 about your engagement by the State of Michigan to assess the
8 voting tabulation problem that arose in that election.

9 Do you recall?

10 **A.** Yes.

11 **Q.** And you were asked about SullivanStrickler's access to
12 voting equipment?

13 **A.** Yes.

14 **Q.** That equipment was provided subject to an Antrim County --
15 excuse me -- subject to a court order; correct?

16 **A.** In Antrim County, yes, it was.

17 **Q.** You were also asked about the layout of Georgia polling
18 sites; correct?

19 **A.** Yes.

20 **Q.** Are you familiar with the concept of ballot secrecy?

21 **A.** Yes.

22 **Q.** How does that factor into your opinions about whether or
23 not an attacker could be detected?

24 MR. TYSON: I'll just object here, Your Honor. I
25 believe this is calling for a legal conclusion regarding ballot

1 secrecy, which is an issue both of the Georgia Constitution and
2 the U.S. Constitution.

3 MR. ANDREU-VON EUW: I'm not asking Dr. Halderman for
4 precise legal understanding. I asked him if he is familiar
5 with the concept.

6 THE COURT: All right. So he's just answering
7 whether he is familiar with the concept of ballot secrecy?

8 MR. ANDREU-VON EUW: And I think he said he was, Your
9 Honor.

10 THE COURT: All right. So do you have a follow-up
11 question?

12 MR. ANDREU-VON EUW: Yes.

13 BY MR. ANDREU-VON EUW:

14 **Q.** How does the concept of ballot secrecy factor into your
15 opinions of whether voters could implement any of the exploits
16 you have identified in Georgia's ballot-marking devices in the
17 voting booth?

18 **A.** Well --

19 MR. TYSON: Same objection, Your Honor.

20 THE COURT: All right. So noted. But I'll allow --

21 THE WITNESS: Yes.

22 THE COURT: You explore ballot secrecy matters quite
23 at length, so I think it is fair game in redirect.

24 Go ahead.

25 THE WITNESS: What I was going to say is, you

1 basically can't have it both ways. Either things are visible
2 on the screen and potentially parts of the voter's ballot are
3 visible to others, or the voter has some way of blocking the
4 screen between their body and the physical layout of the
5 polling place and any privacy shields, in which case you are
6 potentially vulnerable to the voter engaging in manipulation on
7 the screen and getting away with it.

8 BY MR. ANDREU-VON EUW:

9 **Q.** Thank you.

10 I'm going to change topics again, Dr. Halderman.

11 Mr. Tyson asked you about the CISA advisory. I believe it
12 was Tab 2 in your binder.

13 Can you turn to that, please, as I have some questions
14 about it?

15 **A.** Yes. I have it here.

16 **Q.** First, you were asked about language in the advisory
17 indicating that some jurisdictions already have mitigation
18 measures in place.

19 Do you remember?

20 **A.** Yes.

21 **Q.** Would the repeated breaches of Georgia's voting system in
22 Coffee County indicate, in your opinion, anything about the
23 implementation of the CISA mitigation measures in Georgia?

24 **A.** Well, the breaches would indicate that the physical
25 security in place in Georgia was not -- was not sufficient to

1 prevent attacks of this kind.

2 MR. ANDREU-VON EUW: Actually, Tony, could you put up
3 PX 89 just while we're talking about this document.

4 BY MR. ANDREU-VON EUW:

5 Q. Would the use of BMDs in an election with missing or
6 broken seals at the direction of State election officials be
7 consistent with the security practices reflected in CISA's
8 mitigation measures?

9 A. No.

10 Q. Okay. So I want to ask you about the first mitigation, if
11 you could turn to Page 3.

12 MR. ANDREU-VON EUW: Tony, can you zoom in on the
13 text in the top half?

14 BY MR. ANDREU-VON EUW:

15 Q. So the first mitigation, that concerns a -- contacting
16 Dominion systems.

17 Do you see that, Dr. Halderman?

18 A. Yes.

19 Q. Have you seen any communications produced in this case
20 between the Georgia Secretary of State and Dominion as directed
21 by this first mitigation?

22 A. No.

23 Q. Have you seen any evidence that Georgia has started
24 installing software updates on its voting equipment that would
25 remediate the vulnerabilities identified by you and CISA

1 identified?

2 **A.** No.

3 **Q.** Identified by you and verified by CISA?

4 **A.** No.

5 **Q.** Do the Coffee County breaches and the reports from poll
6 workers of missing or broken seals in voting equipment in
7 Georgia elections indicate anything about the implementation
8 about the second mitigation?

9 **A.** Those would indicate that the physical security
10 protections were certainly not robust.

11 **Q.** What does the repeated access to Georgia's voting
12 equipment, including the EMS server in its operational state in
13 Coffee County, indicate about the implementation of CISA's
14 third mitigation, the one regarding chain of custody and voting
15 equipment?

16 **A.** Well, that would indicate that the chain of custody
17 protections on those devices were weak.

18 **Q.** Turning to the fifth mitigation, you demonstrated that a
19 hack of Georgia's BMDs using a part of the printer cable that
20 is accessible -- excuse me -- a part of the USB cable that goes
21 from the BMD to the printer that is accessible, what does that
22 exploit indicate about the implementation of CISA's fifth
23 mitigation?

24 **A.** That it hadn't been implemented.

25 **Q.** The sixth CISA mitigation states, close any background

1 application windows on each ImageCast device.

2 Did you identify any unnecessary software on Georgia's
3 BMDs that posed a security risk of this class?

4 **A.** Yes. The background windows were a consequence of the
5 state Georgia BMDs were in if the Georgia procedures for the
6 software update .32 were applied.

7 **Q.** Okay. I'm going to ask you about the next two
8 mitigations.

9 The first one reads, use read-only media to update
10 software or install files on the ImageCast X devices.

11 The second reads, use separate unique pass codes for each
12 poll worker card.

13 Have you seen any evidence produced in this case that
14 Georgia has diligently implemented the sixth and seventh
15 mitigation that I just read out loud?

16 **A.** No.

17 **Q.** The ninth mitigation which says, disable the unified
18 tabulator security keys feature on the election management
19 system and ensure new cryptographic keys are used for each
20 election.

21 Have you seen any evidence that that has been implemented?

22 **A.** No.

23 **Q.** Are you familiar with Georgia's use of hash testing and
24 logic and accuracy testing?

25 **A.** Yes.

1 **Q.** Do you find it effective?

2 **A.** No.

3 **Q.** Do these testing mechanisms or any testing mechanisms that
4 you are aware of Georgia doing in the -- for the information
5 provided to you in this case satisfy CISA's ninth mitigation?

6 **A.** No.

7 **Q.** The last mitigation reads, conduct rigorous post election
8 tabulation audits of human readable portions of physical
9 ballots and paper records to include reviewing ballot chain of
10 custody and conducting voter ballot reconciliation procedures.
11 This mitigation, CISA notes, these activities are especially
12 crucial to detect attacks where listed vulnerabilities are
13 exploited, such as a barcode is manipulated to be tabulated
14 inconsistently with a human readable portion of the paper
15 ballot.

16 Do you see that?

17 **A.** I do.

18 **Q.** Have you seen any evidence that Georgia has implemented
19 that in elections today?

20 **A.** I know Georgia sometimes conducts -- sometimes requires
21 what they call risk-limiting audits. These mitigations are
22 required -- the CISA -- CISA's recommendations for this to be
23 done in every election. And I -- I don't know -- I have not
24 seen evidence for the ballot -- for rigorous ballot chain of
25 custody and reconciliation.

1 Q. You were asked about your opinion -- or you stated in
2 response to one of Mr. Tyson's questions that Georgia BMDs were
3 not designed with sufficient attention to security.

4 Can you explain why that -- why you believe that is?

5 A. Yes. So the large number, large variety, and the nature
6 of the problems that I found indicate that the software was
7 designed through a process where security was not a primary
8 concern. In other words, how could you put into service a
9 machine where someone could just step up and stick a pen into
10 the power button and exit into the operating system?

11 And there's flaw after flaw that is of that nature of that
12 character. These are problems that someone should have thought
13 of or tested for before a state like Georgia could put these
14 machines in front of millions of people.

15 The architecture of the machine, the security of the
16 machine is just very, very brittle. There were --

17 THE COURT: What do you mean by brittle, exactly?

18 THE WITNESS: By brittle, I mean that a smaller error
19 in the implementation would give an attacker a tremendous
20 amount of access. You saw there were several different ways
21 yesterday that I was able to exploit something and then almost
22 immediately have superuser access through one or two small
23 additional steps.

24 That is the brittleness of the system. And there is
25 not only one way to compromise it. There were several

1 different alternatives for attackers to compromise it in many
2 cases that I was able to show. That's all an indication that
3 the design and engineering processes that produced the software
4 didn't integrate security thinking from the beginning, and it
5 is extremely hard then to retrofit security through simple
6 changes or software patches into a system that didn't have
7 security as a primary design consideration from the start.

8 BY MR. ANDREU-VON EUW:

9 **Q.** Thank you.

10 Changing topics again, Dr. Halderman, you were also asked
11 about the risks associated with Coffee County breaches.

12 How have the breaches in Coffee County increased the risk
13 to future elections using Georgia's current BMD system?

14 **A.** Well, the attackers in Coffee County took information from
15 Coffee that would be sufficient to allow them to create almost
16 an exact replica of a Georgia County EMS, of a Georgia ICC in a
17 laboratory just using standard virtualization environments and
18 so forth.

19 So the attackers could use the access that they got from
20 Coffee County to study the software at their leisure, to
21 discover vulnerabilities including most or all or any of the
22 ones that I discovered or ones that I missed, and then to
23 develop and test ways of exploiting those vulnerabilities,
24 which could be malware, which could be something simple like
25 the technician card attack that I did at the machine, putting

1 the card in multiple times and running a command. And from
2 just that data, they could even -- they could make instructions
3 for a normal nontechnical person to be able to carry out those
4 attacks in a real Georgia polling place.

5 So those are some of the ways in which it has materially
6 increased the risk.

7 **Q.** You mentioned a normal nontechnical person.

8 Have you seen a Georgia voter without a computer science
9 background implement any of the hacks you identified?

10 **A.** Yes.

11 **Q.** Who?

12 **A.** Jeff Schoenberg.

13 **Q.** When?

14 **A.** A few days ago.

15 **Q.** Did you teach him how to implement the hack?

16 **A.** I did.

17 **Q.** How long did it take you to teach him?

18 **A.** Just a very -- handful of tries at most, and he had
19 completely mastered it.

20 **Q.** To your knowledge, approximately how many times has he
21 successfully implemented the hack you designed?

22 **A.** 10 or 15.

23 **Q.** Have you watched him go through the ordinary step of
24 voting on a Georgia BMD?

25 **A.** I have.

1 Q. How does the time it took him to implement your hack
2 compare to the time it took him to vote an ordinary ballot?

3 A. He is faster at hacking than voting the ballot, normally.

4 Q. Changing topics again, Dr. Halderman, you were asked about
5 whether some of your hacks could be detected. Let's assume the
6 hacks can be detected.

7 Even if one assumes that the hack could be detected in an
8 actual election, does that affect your opinion that Georgia's
9 BMDs are too insecure to be used in future elections?

10 A. No. No, it doesn't. Depending on -- it depends what the
11 attacker's goal is. But many attackers, including
12 nation-states, but also politically motivated attackers might
13 well be seeking primarily to cause chaos, to have visible
14 detected problems that will make voters lose faith in the
15 election process or doubt the results and reduce confidence and
16 deter people from voting in the future.

17 So detecting that the voting system has been attacked
18 doesn't necessarily buy you very much as a defender if the
19 attacker just wants to sow chaos.

20 Q. Are you familiar with Gabriel Sterling's testimony in this
21 trial that the Secretary of State plans to remove hacked BMDs
22 in the middle of an election and then proceed with other BMDs
23 if they are to detect a hack?

24 A. I read that testimony.

25 Q. Does that resolve your election security concerns?

1 **A.** Well, no. If you found one BMD that had been hacked, that
2 wouldn't tell you -- you couldn't just conclude, oh, every
3 other BMD must be okay. That is a sign that you may well have
4 a systemic problem. And to go through and try to understand
5 how many BMDs were affected, you essentially have to examine
6 all of them.

7 And with 30,000 machines and each requiring a forensic
8 examination to tell whether it had been altered, that could
9 take weeks or months to complete, and even then might not be
10 dispositive because, of course, malicious software can remove
11 evidence that it was there after it is finished with its task.

12 Also, in a polling place if just one BMD has been hacked
13 even in a simple way, it is doing something overt. Once those
14 ballots are in the ballot box, they are mixed in with the
15 ballots that came from all of the other BMDs. You can't just
16 go back and tell those voters to vote again or go back and find
17 those ballots and say, oh, those votes were flipped, they
18 should have been the other way.

19 The result from the entire polling place is potentially
20 tainted.

21 **Q.** So I want to give you a different scenario.

22 What if a polling place were using hand-marked paper
23 ballots and it was discovered that the scanner had been hacked?
24 Could those votes be recovered?

25 THE WITNESS: Well, in that case --

1 MR. TYSON: Your Honor, at this point I'll just
2 object as beyond the scope of the opinions that have been
3 offered in this case in the Rule 26 report.

4 MR. ANDREU-VON EUW: I don't have the report in front
5 of me, Your Honor, but this is in his reply to Dr. Juan
6 Gilbert.

7 MR. TYSON: Which is not in evidence at this point, I
8 don't believe, Your Honor. Dr. Gilbert's report is not in
9 evidence yet.

10 THE COURT: Well, you can always call him after
11 Dr. Gilbert testifies, even if it is by Zoom.

12 MR. ANDREU-VON EUW: Okay.

13 BY MR. ANDREU-VON EUW:

14 Q. Changing topics again, Dr. Halderman, you were asked about
15 your study of voter verification.

16 Do you remember that?

17 A. Yes.

18 Q. And you were asked how in one scenario that -- I forget
19 how you characterized it. You said something like unlikely or
20 something like that -- they achieved up to 86 percent detection
21 rates?

22 A. Yes.

23 Q. I think it was an impracticable scenario I think is what
24 you called it?

25 A. Yes.

1 Q. So even in that scenario, there were 14 percent of the
2 voters who did not verify their ballots; correct?

3 A. That is right.

4 Q. So those 14 percent of the voters did not detect errors
5 even with a sample ballot for comparison; correct?

6 A. Yes.

7 Q. In an election with millions of voters on BMDs, 14 percent
8 of errors, not -- excuse me -- 14 percent of voters not
9 detecting errors would mean hundreds of thousands of voters not
10 detecting changed ballots; correct?

11 A. You're asking me to multiply again.

12 Q. Hundreds is easy; correct?

13 A. Yes.

14 Q. Okay. I want to ask you about a document that Mr. Tyson
15 asked you about yesterday. He asked you about the Securing the
16 Vote report that was referred to in your joint letter.

17 I apologize. I have a --

18 THE COURT: By saying the joint letter, I'm not sure
19 what the joint letter was.

20 BY MR. ANDREU-VON EUW:

21 Q. He asked you about a document referenced in a joint letter
22 submitted by you and other computer scientists about the
23 reliability of past elections.

24 Do you remember that?

25 A. Yes.

1 THE COURT: All right.

2 BY MR. ANDREU-VON EUW:

3 Q. I apologize. I'm having stapling problems, so I think I
4 might be giving you multiple copies.

5 A. Thank you.

6 Q. So I've handed you the section that was referenced by
7 Mr. Tyson yesterday.

8 Can you turn to Page 80, please?

9 A. Yes.

10 Q. You are faster than me. Give me one second, please.

11 MR. TYSON: I'm sorry, Christian.

12 What are we looking at?

13 MR. ANDREU-VON EUW: Page 80 of the document.

14 MR. TYSON: 80.

15 Is this in evidence yet?

16 MR. ANDREU-VON EUW: No. This is what you asked
17 about.

18 BY MR. ANDREU-VON EUW:

19 Q. Yesterday, you referenced a quote about -- you look right
20 above the recommendations on Page 80.

21 Do you see that?

22 A. Yes.

23 Q. It says, the additional research on ballots produced by
24 BMDs will be necessary to understand the effectiveness of such
25 ballots.

1 **A.** Yes.

2 **Q.** Is that what you were referring to?

3 **A.** Yes.

4 **Q.** If I could ask you to turn back to the prior page. The
5 last sentence of the last paragraph -- the second-to-last
6 paragraph -- excuse me -- before findings, there is a -- the
7 paragraph starts, well-designed.

8 Do you see that?

9 **A.** Yes.

10 **Q.** The last sentence of that paragraph says, unless a voter
11 takes notes while voting, BMDs that print only selections with
12 abbreviated names/descriptions of the contests are virtually
13 unusable for verifying voter intent.

14 Do you see that?

15 **A.** Yes, I do.

16 **Q.** Do you agree with that statement?

17 **A.** I do agree with that.

18 MR. ANDREU-VON EUW: Thank you.

19 I have no further questions.

20 I take that back.

21 BY MR. ANDREU-VON EUW:

22 **Q.** I want to follow up with this thing I brought up earlier.

23 Mr. Tyson asked you a number of questions about
24 hand-marked paper ballots and scanners.

25 Do you remember that?

1 **A.** Yes.

2 **Q.** Including questions about potentially hacking scanners;
3 correct?

4 **A.** Yes.

5 **Q.** Okay. So following up on that topic, if one were to
6 discover that a scanner had been hacked midway through an
7 election in a hand-marked paper ballot system, would it be
8 possible to recover the voters' actual votes?

9 **A.** Yes.

10 MR. TYSON: Your Honor, again, I think we're getting
11 back into Rule 26 territory. This is asking for an opinion
12 about the ability to recover votes, which that is not about the
13 functioning -- this is an area beyond what his opinions are in
14 this case.

15 THE COURT: You were asking him about this. This is
16 just -- you already were asking him about this very issue, so
17 not to allow opposing counsel to complete that would be
18 improper since you opened it and asked his opinion about it, so
19 I don't see that it would be improper to ask further about that
20 opinion.

21 MR. ANDREU-VON EUW: And now I really have no further
22 questions, Dr. Halderman.

23 MR. CROSS: Wait. You didn't get an answer.

24 MR. ANDREU-VON EUW: Oh, I'm sorry.

25

1 BY MR. ANDREU-VON EUW:

2 Q. Do you want me repeat the question?

3 A. I said yes.

4 Yes, the scanner -- you could just go and read the ballots
5 to find out what the correct election result was in that case
6 even if the scanners were hacked.

7 MR. ANDREU-VON EUW: Thank you, Dr. Halderman.

8 MR. TYSON: Your Honor, I would request since
9 Dr. Halderman was asked some questions about the Securing the
10 Vote report from an excerpt -- if it is all right, I would like
11 to move the entire report into evidence just so that the record
12 is clear. We'll bring printed copies or we'll try to locate
13 printed copies but would ask that we could move that in,
14 please.

15 THE COURT: Are there any objections?

16 MR. ANDREU-VON EUW: We did not try to move any
17 portion of this report into evidence, Your Honor, and it is
18 hearsay, so we would object.

19 MR. TYSON: Dr. Halderman was questioned about
20 specific language from the report, so my thought was, for the
21 record, it should be complete.

22 MR. ANDREU-VON EUW: Yesterday, Mr. Tyson asked
23 Dr. Halderman about this very report, and I -- excuse me, Your
24 Honor -- asked Dr. Tyson [sic] about this very report, and
25 Dr. Halderman recalled other portions of the report.

1 And I wanted to follow up on Dr. Halderman's response
2 from yesterday. I was not seeking to introduce the report.

3 THE COURT: Well, let me see the report before -- get
4 a copy of the report, and I'll rule later on.

5 Thank you.

6 MR. TYSON: And, Your Honor, this is an excerpt from
7 the entire report. I believe it is one of the chapters of the
8 report.

9 THE COURT: What this is, is one chapter?

10 MR. TYSON: Yes.

11 MR. ANDREU-VON EUW: Your Honor, I believe we have
12 one copy of the full report. It will take me a second to
13 locate it.

14 THE COURT: All right. Well, you can provide it to
15 me later. Let's just keep on moving because I'm not looking at
16 it this second.

17 MR. TYSON: Certainly, Your Honor.

18 THE COURT: I'm having trouble multitasking as it is
19 without adding to my woes.

20 REXCROSS-EXAMINATION

21 BY MR. TYSON:

22 **Q.** Dr. Halderman, you were asked about a normal voter
23 implementing your attacks on an ICX, and you referenced
24 Mr. Schoenberg.

25 Do you recall that?

1 **A.** Yes.

2 **Q.** And this is probably self-evident, but Mr. Schoenberg was
3 not executing that attack on a BMD that was actually in use in
4 a Georgia polling location; right?

5 **A.** That is right. One that was set up in the same way, but
6 he didn't commit a crime.

7 **Q.** And to get to an ICX as a voter, Mr. Schoenberg would have
8 to check in at a precinct; right?

9 THE COURT: As a voter?

10 THE WITNESS: As a voter, yes, probably so.

11 BY MR. TYSON:

12 **Q.** You were asked questions regarding the impact of
13 malfunctioning equipment and the result that would have to
14 happen after that if a precinct -- the BMDs in a precinct were
15 hacked.

16 Do you recall that?

17 **A.** Yes.

18 **Q.** Are you aware of the election contest rules in Georgia?

19 **A.** I don't remember the full details of those.

20 **Q.** They didn't -- the election contest rules did not factor
21 into your assessment of those situations; right?

22 **A.** I don't remember the details of the rules, and so -- I'm
23 sure that I have thought about them in the past, though. I
24 recall having thought through that issue.

25 **Q.** You testified that if one BMD was malfunctioning or

1 causing indications of hacking that you would -- the State
2 should check all 30,000 BMDs.

3 Do you recall that?

4 **A.** Well, that is not exactly what I said, but the State might
5 need to check all of them.

6 **Q.** And that would be true as well if the State found one
7 malfunctioning scanner? I need to check all 3- or 4000
8 scanners; right?

9 **A.** If they found one scanner that had been hacked, it would
10 almost certainly be prudent to go back and do a statewide audit
11 of all of the scanners, yes. But that is going to be something
12 that will allow you to recover the correct result of the
13 election, and you won't necessarily even be able to do that
14 with the BMDs.

15 **Q.** You testified about hand-marked paper ballots and voter
16 intent.

17 You agree that voters sometimes make mistakes in filling
18 out their hand-marked paper ballot; right?

19 **A.** Voters can make mistakes either on the screen or on the
20 hand-marked ballot, that is true.

21 **Q.** And my question was specifically for hand-marked ballots.

22 If a voter makes a mistake, their intent might not be
23 reflected on that hand-marked ballot; right?

24 **A.** If they make a mistake on the screen, it is the same way.

25 **Q.** If you could answer my question specifically --

1 **A.** I could --

2 **Q.** Sorry.

3 **A.** So your intent might not be reflected in either case, but
4 there is a big difference between your intent not being
5 reflected because you read the form wrong -- right? -- or you
6 didn't see a piece of the ballot in either interface and your
7 intent is wrong because -- is wrongly recorded because someone
8 maliciously changed it.

9 **Q.** But you would agree that there are situations where
10 hand-marked paper ballots do not reflect voter intent; right?

11 **A.** They are -- it is not -- it is not the same kind of
12 situation as an attack on the system, just to be clear. But
13 people can make mistakes naturally with any method of voting.

14 **Q.** And, Dr. Halderman, to answer my question then, there are
15 situations where voter intent is not reflected on a hand-marked
16 paper ballot; right?

17 MR. BROWN: Your Honor, this is asked and answered
18 multiple times.

19 MR. TYSON: I don't believe he has answered it, Your
20 Honor.

21 THE COURT: Go ahead and answer to the extent you
22 can.

23 THE WITNESS: Yes. As with any other voting system,
24 there can be such situations.

25

1 BY MR. TYSON:

2 Q. Thank you.

3 You discussed the brittleness of the system.

4 Do you recall that?

5 A. I do.

6 Q. And that applies to the EMS and its security posture;
7 right?

8 A. No, that was specifically regarding the software in the
9 ICX that I was offering that opinion. There are significant
10 configuration problems with the EMS, and it does have severe
11 vulnerabilities, but I am not offering an opinion about the
12 design.

13 MR. TYSON: That's all I have, Your Honor.

14 MR. ANDREU-VON EUW: No further questions, Your
15 Honor.

16 THE COURT: Okay. I just have one question I wanted
17 to follow up with you about, I hope.

18 EXAMINATION

19 BY THE COURT:

20 Q. I know that your testimony before the court in
21 Pennsylvania in 2016 was discussed at length with you by
22 Mr. Tyson.

23 But my question, just relative to the evolution of
24 cybersecurity issues is: Has the cybersecurity landscape and
25 awareness of cybersecurity concerns generally, and in elections

1 in particular, evolved nationally and internationally since
2 2016?

3 **A.** Yes, it has, Your Honor. I think everyone today in
4 government and in science and even the public is far more aware
5 now that elections face real and severe risks of attack,
6 including by nation-state actors and others, and much of that
7 evidence has only come to light as a result of federal
8 investigations that happened in the aftermath of the 2016
9 election.

10 **Q.** And I hate to beat a dead horse, but what happened in 2017
11 by -- in connection with -- just for the record with the
12 National Academy of Sciences in terms of the report that was
13 issued and the testimony provided before Congress?

14 **A.** Pardon? What are you referring to?

15 **Q.** The report that a host of very esteemed scientists
16 across -- cybersecurity scientists across the country provided
17 to Congress in 2017.

18 I'm just sort of trying to get a sense in the record of
19 the evolution of the concerns and what was to be done and -- as
20 well as in cybersecurity outside of the election context.

21 **A.** Yes. So I might point you first to the findings of the
22 Senate Intelligence Committee about threats to elections. I
23 believe that was in 2017, and it is referenced in my expert
24 report.

25 Then the National Academies produced the Securing the Vote

1 study, which is what we were discussing excerpts from here,
2 which outlined the threat landscape in great detail and made --
3 as well as discussing the security of technologies.

4 Since then, the Academies recommended a significant amount
5 of further research be done on questions like voter
6 verification. Much of that work -- much work on those topics
7 has been completed, including the study that I did that is in
8 evidence or that has been, I think, offered by the State.

9 Those are just a few of the pieces of that evolution.
10 Meanwhile, the landscape of equipment has been evolving as
11 states have been using many hundreds of millions of dollars of
12 federal funding to acquire new equipment as Georgia did. I
13 think it is important to point to Congress having given the
14 states -- I believe it is over a billion dollars now since 2016
15 to address election security, and they have been using that in
16 ways that are some more and some less effective. There has
17 been a lot that has happened in that span of time.

18 **Q.** Well, has the evolution of threats -- basically, all
19 together in terms of cybersecurity, has it evolved and expanded
20 since 2016?

21 **A.** Yes, I would say so for another reason too, that looking
22 at especially the past four years the extreme amount of
23 election-related disinformation as well, much of which is --
24 exacerbates the possibility that attackers will benefit from
25 very visible failures of election equipment, and even very

1 simple attacks on equipment could be used to undermine election
2 results and sow chaos.

3 So we are -- I think the threat landscape now encompasses
4 both the nation-state threats we saw in 2016 which persists to
5 this day, as well as a growing threat from domestic and
6 potentially politically motivated actors with fewer resources
7 than nation-states.

8 **Q.** So another question I had related to the reference to
9 Mr. Lindell's summer of 2021 event.

10 **A.** His cyber symposium.

11 **Q.** Cyber symposium.

12 Do you have any knowledge -- independent knowledge of --
13 at least of whether information was disseminated at that time
14 regarding the various systems that -- including Georgia that
15 Mr. Lindell interfaced with?

16 **A.** Yes. So I have examined in detail the data that was made
17 available publicly at Lindell's symposium, and it includes a
18 version of the Dominion EMS taken from Colorado, which is a
19 newer version of the Dominion software than Georgia -- that
20 Georgia uses. But it also includes the EMS software and other
21 data and software taken from Antrim County, Michigan, which is
22 the same or very similar to the software and configuration used
23 in Georgia.

24 **Q.** And do you have any idea of how many people that was
25 disseminated to?

1 **A.** The Colorado software was made available for download
2 globally, and there is absolutely no telling how many people
3 received copies.

4 The Antrim software was passed to participants privately,
5 and I know there were hundreds of people present at the event,
6 maybe more. It is very, very difficult to -- it is difficult
7 to imagine that it is not floating around to this day.

8 **Q.** And the Georgia equipment and software?

9 **A.** The Georgia equipment and software, I don't know. It
10 is -- it was not in the data.

11 Let me be perfectly clear. The version of the equipment
12 used in Michigan is the -- is essentially the Georgia
13 version -- is, in essence, the Georgia version. The EMS
14 configuration is slightly different, but the version of the
15 other software and equipment is -- in Michigan was 5.5 or
16 5.5-A, and it is only a very small change between the two.

17 It was the Michigan data that was distributed at the cyber
18 symposium event that I verified because I had the -- I have
19 seen it both from Michigan and from Lindell's people in
20 attendance at the event.

21 **Q.** And I know that there was information in the record
22 regarding some of the places that -- where the -- or
23 individuals whom the software here was in -- from Coffee County
24 was distributed to. I'm not sure where -- you know, what that
25 was recorded on.

1 But do you have any idea?

2 I mean, it was provided information to us, but I don't
3 know at this time.

4 **A.** The -- do I know the set of people who --

5 **Q.** No, I'm not asking if you personally know them.

6 Do you know that there is, in fact, some type of record of
7 it having been sent?

8 **A.** Yes. Yes.

9 **Q.** And what is that record?

10 **A.** Of who the Coffee data --

11 **Q.** Distributed to?

12 **A.** -- was distributed to?

13 There is a ShareFile access log that was produced by
14 SullivanStrickler as one of the sources of information about
15 that, I believe. That is referenced in my declaration about
16 Coffee County and Mr. Skoglund's.

17 THE COURT: Okay. All right. Anything else in light
18 of my questions?

19 MR. TYSON: Not for us, Your Honor.

20 MR. ANDREU-VON EUW: Not from us, Your Honor.

21 THE COURT: Is this witness excused, at least for
22 now?

23 MR. ANDREU-VON EUW: Yes.

24 THE COURT: All right. Good luck on the family
25 situation.

1 MR. CROSS: That sound very ominous.

2 THE COURT: No. It is just -- he has an important
3 family situation going on, and I'm hoping that it happens soon
4 for him.

5 I understand that we have a witness by video -- long
6 distance video that we're ready for?

7 MR. McGUIRE: I believe we had a different order. I
8 believe they were going to do some clips -- a clip of
9 something.

10 MR. CROSS: We have a single deposition video clip
11 we're going to play. I think it is -- how many minutes?

12 About ten minutes. It is short.

13 THE COURT: And then you're going to go to Professor
14 Stark?

15 MR. McGUIRE: Then we were going to have our last
16 plaintiff go on a short exam, and then -- oh, then I think
17 that -- yeah.

18 So he is not next. He is tuned in so he can monitor.

19 THE COURT: All right. He understands that. All
20 right. I'm just trying to be courteous to somebody from afar.

21 MR. McGUIRE: Thank you.

22 MR. OLES: Your Honor, I understand the Court is
23 deferring the issue of Ms. Johnston, but she is here waiting
24 today.

25 If it doesn't look like we're going to get to her,

1 can I release her?

2 THE COURT: Why don't you come up here and talk to me
3 about Ms. Johnston's testimony, plaintiffs' counsel.

4 **(A bench conference ensued, as follows:)**

5 MR. OLES: Your Honor, as I had said before,
6 Ms. Janice Johnston is a sitting member of the Georgia State
7 Election Board right now. She was on the plaintiffs' may call
8 list.

9 THE COURT: Right.

10 MR. OLES: Previously they put in the evening
11 reminder that she was going to be called in. We have been
12 relying upon that. I have let both my co-plaintiffs' counsel
13 know that I have an interest in posing some questions to her.
14 It will take all of about 30 minutes, I think.

15 THE COURT: What is the nature of the questions that
16 you want to ask?

17 MR. OLES: These questions have to do with about
18 three matters that have been looked at by the State Election
19 Board that she will have some knowledge of.

20 THE COURT: What are those?

21 MR. OLES: These have -- I have the details.

22 The first is with regard to Complaint
23 Number 2023-025. It has to do with the issue of ballots that
24 were not rejected by the Dominion system in the Fulton County
25 count in 2020.

1 THE COURT: That they were not rechecked? Is that
2 what you said?

3 MR. OLES: They were not rejected.

4 THE COURT: Were not rejected?

5 MR. OLES: Right. And the second one has to do with
6 SEB 2022-348, and that has to do with a QR code signature
7 mismatch, which, again, meant that the system was incorrectly
8 rejecting ballots, which I was going to ask her about.

9 And the third has to do --

10 MR. CROSS: Could I ask you, David, is that -- what
11 kind of ballots were being rejected?

12 MR. OLES: Are you talking about as the counts or
13 re-counts?

14 MR. CROSS: The signature mismatch, what kind of
15 ballots?

16 MR. OLES: Yeah.

17 MR. CROSS: Is that signature on mail-in ballots?

18 MR. OLES: Hold on one second.

19 I think they were -- no, I don't think they were
20 mail-in. I think that was -- wait a minute.

21 MR. CROSS: I mean, no one signs a BMD ballot.

22 MR. OLES: Right. Yeah. That would have to be
23 mail-in. Okay.

24 THE COURT: Mail-in ballot, you say?

25 MR. OLES: I don't have it right in front of me.

1 The third has to do with the memory card retention
2 policy.

3 And so these three things have been looked at by the
4 State Election Board. I would like --

5 THE COURT: What is the memory card retention policy
6 issue?

7 MR. OLES: This has to do with the fact that they
8 were -- the fact that the counties -- the -- under the current
9 policy, the memory cards were not being returned -- retained
10 for the time period under state and federal law. And as a
11 result, there has been audit capabilities lost in this. And I
12 would like to ask her about that as well.

13 MR. CROSS: The memory cards from what?

14 MR. RUSSO: Are you talking about a State Election
15 Board rule? I'm sorry.

16 MR. CROSS: No, no.

17 MR. RUSSO: I'm just trying to see what the policy
18 is. I mean, I --

19 MR. OLES: My understanding is that -- from what I
20 know about this, is that they have been destroyed as early as
21 60 days after an election, despite the federal and state
22 two-year requirement.

23 MR. CROSS: But what memory cards?

24 MR. OLES: These are the --

25 MR. CROSS: From the tabulators, from the scanners?

1 MR. OLES: The question --

2 MR. BROWN: The election file, I think.

3 MR. CROSS: That comes from the scanner.

4 THE COURT: I tell you what --

5 MR. CROSS: None of this --

6 THE COURT: I know that there are those of us who
7 need a bathroom break. Why don't you find out meanwhile the
8 answers to the questions they have been asking. And we'll
9 start back in two minutes.

10 **(The bench conference was thereby concluded.)**

11 THE COURT: Ladies and gentlemen, we're still trying
12 to resolve this, and we're going to take also a short bathroom
13 break.

14 So if you want one now, now is the time for a
15 five-minute break. But we're going to come back as soon as
16 we're done.

17 **(A brief break was taken at 3:03 PM.)**

18 **(A bench conference ensued, as follows:)**

19 MR. OLES: All right. Your Honor, we've got a little
20 bit of clarification. The QR signature issue is not a physical
21 signature --

22 THE COURT: Wait. Wait. We don't have --

23 MR. CROSS: I'm good. Oh, Bruce is coming. Run
24 Bruce run.

25 MR. OLES: The QR --

1 THE COURT: Wait, wait, wait.

2 (There was a brief pause in the proceedings.)

3 MR. OLES: The 2022-348 matter with regard to the
4 signature -- the QR code signature mismatch is not signature in
5 a physical writing sense. It is signature of the code itself,
6 and that is from the BMD.

7 MR. CROSS: Where -- there was a QR code mismatch?

8 MR. OLES: Yes.

9 MR. CROSS: In what context?

10 MR. OLES: Well, not being an expert myself, I would
11 have to ask the people that know a little bit better.

12 MR. CROSS: The guy who is feeding you all these
13 questions?

14 THE COURT: None of that right now.

15 MR. CROSS: Sorry. Fair enough.

16 MR. RUSSO: Well, it is not directed at us. So I'll
17 listen.

18 MR. CROSS: What is the factual predicate, though,
19 for the question? What is the factual predicate for the QR
20 code question?

21 MR. BROWN: There was -- apparently, there was some
22 complaint that the --

23 MR. OLES: Yeah, there was a complaint made.

24 MR. BROWN: -- SEB was responding to --

25 COURT REPORTER: I can't hear you, Bruce. You're

1 behind me.

2 THE COURT: Swap positions with David.

3 MR. BROWN: I will speak a little bit louder.

4 Apparently, there was an SEB proceeding or matter
5 that involved a QR code mismatch; is that correct?

6 MR. OLES: That's correct.

7 THE COURT: All right.

8 MR. OLES: And the third had to do with the issue
9 with the memory card retention policy. It is a matter of
10 compliance with state and federal law with the federal
11 requirement being 22 months, the state requirement being
12 24 months. Neither one is being -- at least not consistently
13 being complied with, which makes, obviously, audits impossible.

14 THE COURT: And the question they asked you before is
15 what memory card -- what type of memory card.

16 MR. OLES: That I don't exactly have the answer for.

17 THE COURT: Okay.

18 MR. TYSON: I think the only memory cards in the
19 system, Your Honor, would be the ones in the tabulators.
20 There's no memory cards on board the BMDs or the EMS.

21 THE COURT: Well, all right. So we have the -- the
22 signature card was --

23 MR. OLES: It is the QR code --

24 THE COURT: And then you have the Fulton ballots not
25 rejected.

1 MR. OLES: Yes.

2 THE COURT: I'm going to allow you to do two and
3 three, not one. The Fulton County ballots, that is a whole
4 other -- I think that is -- we're back to hand ballots on that,
5 most likely.

6 MR. RUSSO: So what was two and three, again? I'm
7 sorry.

8 THE COURT: Two and three was the QR code one. I
9 don't know what's the story on the memory retention, but it
10 doesn't sound like it is much work to be able for him to
11 elicit. And the witness is here, but I'm -- I think -- I can't
12 understand why you wouldn't be able to ask questions and be off
13 within ten minutes, unless it gets very surprisingly. Because
14 you don't even yourself know enough to be able to -- I don't
15 mean this is an insulting way. I just mean we don't have
16 enough information that I can imagine this going on for any
17 period of time. But I'll let you do that.

18 MR. OLES: Well, I'm fine pushing this off until
19 Monday. That would allow me a little bit more time.

20 THE COURT: Well, you've got the witness here. That
21 is what you said. So let's just go ahead and do it.

22 MR. RUSSO: Yeah.

23 MR. BROWN: Your Honor, we have a witness who has
24 been here for all week that we would really like to get in
25 before Dr. Johnston.

1 THE COURT: Who is that?

2 MR. BROWN: Kevin -- that's Ms. Missett. She is a
3 quick one. I would like to get her out.

4 THE COURT: She's a plaintiff.

5 MR. BROWN: Yeah. And then Kevin Skoglund is from
6 Pennsylvania, and he would have to stay the weekend, and he has
7 been here for --

8 THE COURT: All right. So we need to get him in.
9 All right. So if we can, we'll get your witness in.

10 MR. RUSSO: He is an expert.

11 THE COURT: You really actually think he's going
12 to --

13 **(Unintelligible cross-talk)**

14 MR. MILLER: Logistically, I think we're probably
15 coming back for Monday cross-exam regardless if his direct
16 starts today.

17 MR. RUSSO: I mean, he's had like 12 declarations in
18 this case.

19 MR. BROWN: Well, we can just move to admit those.

20 MR. RUSSO: I don't think we're going to do that.

21 MR. OLES: Well, I'm fine just telling Ms. Johnston
22 that we need her to come back. I just need to know one way or
23 the other.

24 THE COURT: All right. Since I think you probably
25 should let Ms. -- Mr. Skoglund -- or Dr. Skoglund go home

1 because that sounds a little threatening.

2 MR. BROWN: At least his wife isn't expecting.

3 MR. CROSS: One quick thing then.

4 THE COURT: He's more likely to get a plane.

5 MR. RUSSO: Your Honor, I'll just say: If
6 Mr. Skoglund needs to do it over Zoom on Monday because of
7 travel back and forth or something, I mean, I'm not necessarily
8 opposed to -- I realize it is a lot more difficult than coming
9 back and fumbling around, but --

10 THE COURT: It is fine for me.

11 COURT REPORTER: It is terrible for me, if anybody
12 cares.

13 MR. RUSSO: Okay. So I --

14 THE COURT: No. I care but --

15 MR. BROWN: We're trying to balance. This may be
16 more information that you need, but we also have Dr. Stark as
17 one of our witnesses.

18 THE COURT: Right.

19 MR. BROWN: And Dr. Stark can't travel because of his
20 recent surgery. And he also has to start later. So it could
21 be that it does work fine to have Mr. Skoglund start Monday
22 morning and then follow that with Dr. Stark.

23 Is that right?

24 MR. RUSSO: However you want to do it.

25 You want to have both of them on Monday.

1 Is that what you are saying?

2 MR. BROWN: Yes.

3 MR. RUSSO: That's fine. They can both go on Monday.

4 MR. CROSS: One other quick thing. Your Honor
5 obviously is aware of what is going with Dr. Halderman and his
6 wife. We're not going to do the demonstration we were going to
7 do with Jeffrey Schoenberg because Dr. Halderman --

8 THE COURT: You're not going to do what?

9 MR. CROSS: The demonstration we were going to do
10 with Mr. Schoenberg on the first day, we're not going to do
11 that now in our case in chief because Dr. Halderman has to go.
12 And he has already talked about the fact that Mr. Schoenberg
13 has done it. So it is in the record. So we'll --

14 THE COURT: That's fine.

15 MR. CROSS: So Mr. Schoenberg we're not planning to
16 recall in our case in chief. That will shorten the day a
17 little bit too.

18 THE COURT: Okay. Let's -- so who would be your next
19 witness?

20 MR. BROWN: Megan Missett.

21 MR. CROSS: We have the short Gilbert clip. It is
22 Juan Gilbert. It is less than ten minutes, I think, and then
23 Megan Missett.

24 MR. BROWN: We can do all three.

25 THE COURT: And I would like to get your person in

1 too.

2 MR. BROWN: We're mindful of what comes next, so
3 we'll be very quick with Megan Missett.

4 MR. OLES: Judge, if I understand, if I'm not going
5 to be allowed to proceed on the first one, that is your ruling
6 and I respect that. I would appreciate being allowed to do a
7 proffer of what I was --

8 THE COURT: Sure. Sure.

9 MR. OLES: All right.

10 MR. TYSON: Thank you, Your Honor.

11 **(The bench conference was thereby concluded.)**

12 THE COURT: So is Plaintiff Missett your next
13 witness, or is the --

14 MR. SCHEINMAN: At this time we would like to offer a
15 short video excerpt from the deposition of Juan Gilbert, the
16 State's expert.

17 THE COURT: Do we have to do this right now? I mean,
18 is there some logical reason -- why wouldn't I do this at the
19 end --

20 MR. SCHEINMAN: We think it --

21 THE COURT: -- so that all of these live witnesses
22 can proceed?

23 MR. SCHEINMAN: It is a ten-minute clip that we
24 believe dovetails nicely with Professor Halderman's testimony.

25 THE COURT: Well, I have attention level that can

1 continue until 5:00 to watch that.

2 MR. SCHEINMAN: Then we can offer another witness at
3 this time.

4 MR. BROWN: Your Honor, plaintiffs would call Megan
5 Missett.

6 COURTROOM DEPUTY CLERK: Please raise your right
7 hand.

8 **(Witness sworn)**

9 COURTROOM DEPUTY CLERK: Please have a seat. If you
10 would, state your name and spell your complete name for the
11 record.

12 THE WITNESS: My name is Megan Missett, M-E-G-A-N,
13 M-I-S-S-E-T-T, also known as Margaret on my birth certificate,
14 M-A-R-G-A-R-E-T.

15 Whereupon,

16 MEGAN MISSETT,

17 after having been first duly sworn, testified as follows:

18 DIRECT EXAMINATION

19 BY MR. BROWN:

20 **Q.** Dr. Missett, good afternoon. Thank you for bearing with
21 us.

22 Are you a named plaintiff in this case?

23 **A.** Yes.

24 **Q.** And are you also a member of the Coalition for Good
25 Governance?

1 **A.** Yes.

2 **Q.** When did you become a member?

3 **A.** 2017.

4 **Q.** Backing up a bit, do you have a college degree?

5 **A.** I do, from Sarah Lawrence College.

6 **Q.** Do you have a graduate degree?

7 **A.** I have a Ph.D. from Saint John's University in clinical
8 psychology.

9 **Q.** After you received your doctorate degree, did you practice
10 as a psychologist?

11 **A.** I did in New York City and in Mississippi.

12 **Q.** And when did you move to Georgia?

13 **A.** 1996.

14 **Q.** Do you vote?

15 **A.** Yes.

16 **Q.** Where do you vote?

17 **A.** Where do I vote? In Fulton County.

18 **Q.** At the present time, how do you typically vote, absentee
19 or in person by BMD?

20 **A.** I usually vote in person by BMD.

21 **Q.** Why do you use BMDs instead of by hand using absentee
22 ballots?

23 **A.** Well, obviously, voting absentee by mail is the only way I
24 can vote on a hand-marked paper ballot in the State of Georgia,
25 but I've had so many problems obtaining an absentee ballot that

1 I just decided it is better to actually cast a vote that might
2 be untrustworthy versus not being able to get the ballot at
3 all.

4 **Q.** Dr. Missett, when you vote on a BMD, do you typically
5 check over the ballot card that the BMD prints out before you
6 insert it into the scanner?

7 **A.** I definitely try to.

8 **Q.** Is it easier or hard to review a BMD ballot card to see if
9 it reflects your -- your actual choices?

10 **A.** It is difficult to review the card.

11 **Q.** And why is that?

12 **A.** Well, for one thing, I need to remember to bring my specs
13 because the writing is very small, but it is difficult because
14 you don't have the context of -- you know, it is just a list of
15 names, and even harder, it is a list of yes, no, yes, no if
16 you're talking about one of your party's questions or one of
17 the referendum questions.

18 **Q.** When you are talking about party questions, you're talking
19 about if it is a primary and you have Democrat questions and
20 Republican questions; correct?

21 **A.** Right.

22 **Q.** And does the ballot card typically describe the content of
23 the question?

24 **A.** No, not at all. It just says yes or no.

25 **Q.** Could you give me a rough estimate of the number of --

1 well, you voted in Fulton County in the midterms?

2 **A.** Yes.

3 **Q.** May '22; correct?

4 **A.** I think that was -- okay. It was a special -- it was
5 midterms; right.

6 **Q.** Do you recall roughly how many races there were and ballot
7 choices there were?

8 **A.** I did count that one after the fact. It was 46.

9 **Q.** 46 total questions?

10 **A.** (Witness nods head affirmatively.)

11 **Q.** And when you are reviewing your ballot card, are you able
12 to compare that against the BMD screen?

13 **A.** No. No. Once you push the buttons to vote, the screen
14 turns off.

15 **Q.** As a voter, have you had the opportunity to observe other
16 voters in line with you?

17 **A.** Yes.

18 **Q.** And have you been -- without violating their privacy, have
19 you been able to determine whether they are checking their
20 ballot cards?

21 **A.** Yes. When it is crowded and there has been a long wait, I
22 can see a lot of people up before me. And no, I have never
23 seen anyone check their ballot.

24 **Q.** In your voting location, are there any physical
25 constraints that make it more difficult to review your ballot

1 card completely and carefully?

2 **A.** There can be. And one of the times that I really wasn't
3 able to check my ballot, it was the December -- it was early
4 voting December 2nd, 2022. I was early voting at the Ponce de
5 Leon Library, and it was long lines. It took my husband and I
6 two hours to get through. And so people were -- the line was
7 going way out onto Ponce de Leon Avenue.

8 So I think that they were trying to get more people into
9 the building so that wasn't happening, so they changed the
10 anteroom where you usually vote and do everything into lines
11 for checking in on the pollbooks. And they turned the
12 library -- most of the library into, you know, like an
13 amusement park, you know, lineup.

14 And they had -- they put all the BMDs in this little
15 alcove with the printer sort of on the outside. And it was
16 very difficult to actually get to and from -- you know, the
17 BMDs to the scanner. I actually had to turn sideways and
18 squeeze past people who were voting.

19 And there was, you know, a certain amount of pressure and
20 anxiety because people had been waiting a long time. So when I
21 went out after I finished voting to get to the scanner to feed
22 my ballot card, I was just -- I was creating a log jam. And it
23 takes me like three minutes to really go through.

24 So I had to keep people from coming in or going out, and I
25 just -- I couldn't do it. I thought it was too much of a

1 grievous injury. It was to --

2 **Q.** I'm sorry?

3 COURT REPORTER: I didn't hear the answer to the
4 question.

5 THE WITNESS: Oh, I'm sorry.

6 THE COURT: Say again what you just said.

7 COURT REPORTER: What was the last --

8 THE COURT: What was the last sentence you said?

9 THE WITNESS: I think I said it felt like I was -- it
10 was too much of a burden on other people to have to wait
11 three minutes to get by me in order to -- so that I could stop
12 and read my ballot card.

13 BY MR. BROWN:

14 **Q.** Now, Dr. Missett, you have -- you are choosing now to vote
15 absentee.

16 If you had your druthers, regardless of the mode of
17 voting, would you prefer to vote by mail or in person on
18 election day?

19 **A.** Oh, definitely in person.

20 **Q.** Why?

21 **A.** It is corny, but I just love to vote in person. I was
22 raised that way. My parents brought me to their polling place
23 in New Jersey, and, you know, I'd go behind the curtain with
24 them and watch them pull the lever. I did the same with my
25 kids. It is kind of like my 4th of July.

1 But also, I love seeing the election workers, and, you
2 know, I don't even know their names, but I see them every year.
3 I love to thank them, and that is both at my regular polling
4 place and the place I usually early vote. And I love just
5 being -- it is just a community ritual that I value. I love
6 seeing my neighbors. It is -- I really do like to do it that
7 way.

8 **Q.** Dr. Missett, as a named plaintiff in this case, what
9 relief are you seeking to redress the injuries that you have
10 described both today and in the litigation?

11 **A.** We are asking the Court to ask the State to stop forcing
12 in-person voters to use BMDs.

13 **Q.** Do you intend to vote in future elections?

14 **A.** I do.

15 MR. BROWN: No more questions. Thank you very much.

16 CROSS-EXAMINATION

17 BY MS. LAROSS:

18 **Q.** Hello, Dr. Missett. My name is Diane LaRoss, and I
19 represent the State defendants. We met over Zoom.

20 **A.** Right, right, right.

21 **Q.** It is nice to meet you in person.

22 **A.** It is nice to meet you.

23 **Q.** So you had mentioned that you go by Margaret and Megan
24 Missett; correct?

25 **A.** No one has ever called me Margaret, but it is in my

1 paperwork.

2 **Q.** You mentioned it was on your birth certificate, but it is
3 also the name under which you vote; correct?

4 **A.** Yes.

5 **Q.** I just wanted to make sure the record is clear about that.
6 And you say that you live and vote in Fulton County; is
7 that right?

8 **A.** Yes.

9 **Q.** And you'll have to wait until I finish my question before
10 you answer.

11 **A.** Oh, I didn't realize. I'm sorry.

12 **Q.** It is just so the court reporter can get a clear
13 transcript of all of your testimony.

14 So -- and you have lived continuously in Fulton County
15 since you moved to Georgia in 1996; correct?

16 **A.** Yes.

17 **Q.** And you mentioned that you have your doctorate in
18 psychology.

19 But you have not practiced as a psychologist since you
20 moved to Georgia in 1996; is that correct?

21 **A.** That's correct.

22 **Q.** And you are not testifying here as an expert at this
23 trial --

24 **A.** No, I'm not.

25 **Q.** -- correct?

1 So you don't have any formal education or training in
2 election law; correct?

3 **A.** I don't.

4 **Q.** And no formal training or education in computer hardware
5 or hacking or cybersecurity; correct?

6 **A.** No.

7 **Q.** Okay. And you testify -- and you've pretty much voted in
8 every election since you moved to Georgia; correct?

9 **A.** No.

10 **Q.** Oh, you haven't?

11 **A.** I would say that I've voted in every election since early
12 2016. I have always been very interested -- you know, I love
13 voting, but I was not as tuned in to some of the state and
14 federal elections until a few things happened, and then I was
15 like, I really, really need to focus harder and give more
16 energy to -- to some of these issues. And after that, I never
17 missed.

18 **Q.** Okay. So you never missed an election after 2016; is that
19 correct?

20 **A.** That is right.

21 **Q.** You did some voting --

22 **A.** Oh, definitely, definitely, but I'm sure I missed some
23 midterms or some special elections.

24 Did I interrupt you? I'm sorry.

25 **Q.** So you did some voting between 1996 and 2016, but it was

1 after 2016 when you started voting in every election possible;
2 is that correct?

3 **A.** That's correct.

4 **Q.** Okay. And you do not have any evidence that any vote
5 you've cast in any Georgia election has not been counted;
6 correct?

7 **A.** I don't have any evidence of that.

8 **Q.** And you don't have any evidence that any vote that you
9 cast in Georgia was ever changed from how you wanted it to be
10 counted; correct?

11 **A.** I don't have any evidence of that.

12 **Q.** And you don't have any evidence that any Georgia election
13 has actually been hacked or subjected to the insertion of
14 malware; correct?

15 MR. BROWN: Your Honor, calls for speculation. There
16 is no possible way that this witness would know whether or not
17 other people's votes had been counted or not because of the way
18 that Georgia collects election votes on a BMD system.

19 MS. LAROSS: So we're just looking to make sure the
20 record is there that there isn't any other evidence out there
21 and that this witness doesn't have any further evidence. That
22 is simply all we're asking.

23 THE COURT: Personal evidence. I mean, she's
24 obviously been active in this organization that has been
25 collecting evidence, and she's obviously, from her affidavits,

1 participated in the collection of evidence.

2 So are you wanting to go through all of that?

3 MS. LaROSS: No. I'm just asking her just the
4 general question.

5 THE WITNESS: Can you repeat what the question was?

6 BY MS. LAROSS:

7 Q. Sure. And you don't have any evidence that any -- you
8 yourself don't have any evidence of any Georgia election that
9 has actually been hacked or subjected to the insertion of
10 malware; correct?

11 A. No, I don't.

12 Q. And your concern in this case with Georgia election
13 equipment is the possibility that those things might happen;
14 correct?

15 A. Yes.

16 Q. And you mentioned that you have voted on BMDs; correct?

17 A. Uh-huh (affirmative).

18 Q. You'll have to say yes or no.

19 A. Yes.

20 Q. Thank you.

21 And then you have also voted by absentee ballot; correct?

22 A. Yes.

23 Q. And am I correct to understand that you voted twice by
24 absentee ballot?

25 A. Yes. At least twice.

1 Q. Okay. And you voted in the November 2020 election by
2 absentee ballot; is that correct?

3 A. Yes.

4 Q. And then as well the January 2021 runoff, you voted by
5 absentee ballot; correct?

6 A. Yes.

7 Q. And in those two elections, did you have any trouble
8 voting by absentee ballot?

9 A. No, I didn't. We had the drop boxes then and a longer
10 time. I didn't have trouble that time. I did in June 2020.

11 Q. And so in June 2020, was the trouble that you didn't
12 receive your ballot in time?

13 A. That is right. So I went to early vote on the last day of
14 early voting.

15 Q. And you were able to cast your ballot on the BMD?

16 A. I was. It was a four-hour wait, but I was able to.

17 Q. You didn't like those lines.

18 So you're aware that the absentee ballots are -- the
19 applications and the ballots themselves are sent out from
20 Fulton County and not the State of Georgia; correct?

21 A. Yes.

22 Q. So when you didn't receive your absentee ballot in that
23 particular -- the June election that you spoke about, that
24 would have been that Fulton County didn't mail it to you in
25 time; correct?

1 **A.** Yes. And I contacted them, and I copied Rick Barron, who
2 was the director at the time, and he got back to me and said he
3 was going to send it express. And I'm sure he tried, but they
4 had -- you know, I think they were doing the best that they
5 could.

6 **Q.** And you are not claiming that the State of Georgia caused
7 that problem?

8 **A.** No, no, no.

9 **Q.** Okay. And so -- so when you voted using BMDs, that was at
10 a Fulton County precinct; correct?

11 **A.** Yes.

12 You mean in June?

13 **Q.** Well, let's -- yeah. Let me clarify that for you.

14 Before the two times you voted on it by absentee ballot in
15 2020, you had voted on BMDs before that point?

16 **A.** Yes.

17 **Q.** And then after the January 2021 runoff, you voted on BMDs
18 for every election since then; correct?

19 **A.** Yes.

20 **Q.** And by my count, it is about eight elections.

21 Does that sound about right to you?

22 **A.** That sounds about right.

23 **Q.** Okay. And when you voted by absentee ballot, did you
24 check your ballot before you put it in the drop box?

25 **A.** I always try.

1 Q. Okay. And so then let's talk about voting on the BMDs.

2 When you voted on the BMDs, did you check your ballot for
3 the -- sorry. Let me start over the question, if I may.

4 So when you voted on the BMDs, did you check the ballot
5 that got printed out and check your selections?

6 A. Yes. When you vote on a BMD, you also are asked to check
7 the screen, so it is really two checks you are supposed to
8 perform. So after you, you know, push your buttons, then the
9 BMD says, you know, review -- review your votes, and then you
10 have a choice of either going back and changing if it is not
11 right or pushing the button to cast your vote. So you do that,
12 and then after it is out, you are supposed to then check
13 your -- the human readable text on the ballot card.

14 Q. And when you vote on BMDs, you check it -- you check your
15 vote in both ways that you just described --

16 A. I do.

17 Q. -- correct?

18 Have you ever found something incorrect when you've
19 double-checked?

20 A. I have not, as far as I know. I'm always a little worried
21 that if it skips something that I won't know that.

22 But yeah, I'm not totally confident. But as far as I
23 know, they were correct.

24 Q. Okay. So it was correct when you reviewed the selections
25 on the screen; plus, it was correct when you viewed the

1 printed -- the readable text on the ballot; correct?

2 **A.** It is right that I have confidence in what I read on the
3 screen because the context is there, the question or, you know,
4 which, you know, candidates there are.

5 **Q.** Okay. And if there was something that wasn't right, you
6 would certainly have followed up and talked to some of the
7 folks at the precinct; correct?

8 **A.** Yes. I hope so. I would have felt pretty bad if it was
9 one of the crowded times, but yeah.

10 **Q.** But you wouldn't walk away and just say, whatever, it
11 doesn't matter to me?

12 **A.** No, especially not with the human readable on the QR
13 because that is the only way to catch that kind of hack if
14 there is such a hack. That is the only way. If you don't
15 catch the discrepancy, it gets fed, you know, into the machine
16 and there is no way to go back and find that out. So it is a
17 big deal.

18 **Q.** So -- but you do check the human readable portion that is
19 on the ballot; correct?

20 **A.** I do.

21 **Q.** To make sure that your ballot is cast -- is counted as
22 cast; correct?

23 **A.** I do.

24 **Q.** And when you sent your absentee ballots in or we dropped
25 them into the drop box, when your votes were tabulated, you

1 weren't present; correct?

2 **A.** No.

3 **Q.** And you weren't able to confirm that your absentee ballot
4 was actually counted as cast; correct?

5 **A.** No. I mean, you can get an update on your My Voter page,
6 but it isn't the same as using a hand-marked paper ballot in
7 person at the polling place where you can watch them feed it
8 into the scanner.

9 **Q.** Right. So -- and that is the -- when you vote on a BMD,
10 you can -- you actually feed the ballot into the scanner;
11 correct?

12 **A.** Yes.

13 **Q.** And once the ballot is fed into the scanner, you don't
14 really have any idea or you can't check by standing there if
15 the ballot is actually cast as counted; correct? It is just
16 tabulated within the machine?

17 **A.** Yes.

18 **Q.** And that's true of the hand-marked paper ballots as well
19 that -- I mean, you can see -- you can see that the ballot was
20 placed into the scanner, but the -- you can't verify that each
21 of your votes were cast as counted on the inside of the
22 tabulation in the scanner; correct?

23 **A.** That's true. I mean, the part I'm worried about is the --
24 you know, putting a hackable electronic device between me and
25 my vote there at the very beginning. That is the true sample

1 you need. It is not recoverable the way that -- if the scanner
2 made a mistake, you could go back to a trustworthy ballot if it
3 was a hand-marked paper ballot. So that is the part I'm
4 worried about.

5 **Q.** And that is the concern because there is a QR code
6 involved?

7 **A.** Yes.

8 **Q.** And so you base your concerns on opinions of experts; is
9 that right?

10 **A.** Yes.

11 **Q.** And, again, it is just the possibility that hacking or
12 something, your vote could be compromised that you are
13 concerned about here?

14 **A.** Yes.

15 Or, you know, malfunctioning could also --

16 **Q.** Yeah.

17 **A.** -- happen with a QR code, yeah.

18 **Q.** And you talked a bit about when you voted and there were
19 long lines and you had to squeeze through --

20 **A.** Right.

21 **Q.** -- and there was -- and I think there was also one point
22 where you talked about where there was -- BMDs were placed in
23 an alcove.

24 Do I have that correct?

25 **A.** That's correct. That was the same election.

1 Q. It was the same election.

2 And the decision on where to place the BMDs at the
3 precinct, that is made by Fulton County; correct? By the
4 county officials?

5 A. Yeah, I believe so.

6 Q. Okay. And the long lines -- you're not -- you don't have
7 a claim in this case about long lines; correct?

8 A. No, I'm not making a claim about that.

9 Q. That would be a result of --

10 A. But I might say that sometimes it is because the system is
11 glitchy.

12 Q. It is glitchy when there can be long lines?

13 A. That is what happened in June.

14 Q. Yeah. And that is -- again, that is a problem by the
15 county officials; correct?

16 A. I think it is a problem with the BMDs and the scanners.

17 Q. So it is a -- okay.

18 So you are saying if it takes a little bit longer for
19 people to vote on the BMDs that it could hold up the line?

20 A. Right.

21 Q. And it would take a little bit of time --

22 THE COURT: She said something else, Counsel. Let's
23 be fair. She said she thought it was glitches on the part of
24 the functioning of the BMDs.

25 MS. LaROSS: Yeah. I apologize. You did say that.

1 I did not mean to misstate her statement, Your Honor.

2 BY MS. LAROSS:

3 Q. And the -- when you are talking about the glitchy part,
4 that is in part based upon reports of experts; correct? And
5 not your own personal opinion?

6 A. No. That was people coming -- you know, when the line
7 reached the place where people are coming out, they are saying
8 one of the scanners isn't working in the BMD, I have been here
9 for five hours.

10 So they would give us, you know, their reports as they
11 came out why this was taking so long.

12 MS. LaROSS: And, Your Honor, I would just object to
13 the testimony concerning hearsay.

14 THE COURT: So noted.

15 BY MS. LAROSS:

16 Q. And so that --

17 THE COURT: But that is your understanding?

18 THE WITNESS: That is my understanding.

19 THE COURT: Were you a poll watcher then, or were you
20 waiting simply to get a chance to vote?

21 THE WITNESS: I was in line, but I'll also say that
22 this was also reported in the press about why, you know,
23 different precincts were having such long --

24 MS. LaROSS: Sure. And I would object to that as
25 well as hearsay, Your Honor.

1 MR. BROWN: Your Honor, the defendants asked the
2 question. She's entitled to give a full answer of her
3 understanding.

4 MS. LaROSS: Sure. And I can object to her if some
5 of the testimony is based on hearsay, and that is what I'm
6 doing.

7 THE COURT: I understand.

8 But she's giving an explanation of her understanding,
9 and she is standing in a line for a substantial period of time.
10 That is what was asked about, so --

11 MS. LaROSS: Then I will, yeah, follow up on those
12 statements then.

13 BY MS. LAROSS:

14 Q. So when folks are saying the scanners weren't working, do
15 you have any idea if that was a result of problems with the
16 power source, or they weren't plugged in correctly, or
17 operational error by the voter themselves? Do you have any
18 idea if any of those things were factors in those statements?

19 A. I don't know what the cause of the glitchiness was.

20 Q. The glitchiness.

21 So you're not testifying that you have evidence that the
22 glitchiness that you're talking about is a result of some kind
23 of hack in the election equipment --

24 A. No.

25 Q. -- or malware?

1 **A.** No.

2 **Q.** Okay.

3 **A.** But I am aware that this is an issue with the BMDs and
4 that in some other states that was one of the major reasons
5 they decided not to go with BMDs.

6 **Q.** So you -- but that, again, is something that you have
7 heard through experts or read in the newspaper?

8 **A.** Correct. Or I read the testimony.

9 **Q.** Okay. Are you aware that magnifying glasses are provided
10 at polls?

11 **A.** No.

12 **Q.** Because you mentioned that sometimes you have to remember
13 to bring your specs.

14 But you weren't aware of that?

15 **A.** No, I didn't know that.

16 THE COURT: I don't think I have any information in
17 the record about that, so I'm going to strike that because
18 we -- you haven't presented any information. You just asserted
19 that.

20 MS. LaROSS: Yeah. I think we've asked the question
21 before of folks, but --

22 THE COURT: All right. If you have -- but it doesn't
23 make any difference. I have no evidence that this is a
24 standard piece of equipment in the polls. I have never seen
25 it.

1 MS. LaROSS: I guess everyone would like to see it,
2 and we may present it during our case, Your Honor.

3 THE COURT: Okay. Looking forward to that.

4 MS. LaROSS: I can bring a magnifying glass; right?
5 Just kidding.

6 Okay. Let me just see if I have covered everything I
7 need to.

8 BY MS. LAROSS:

9 Q. Dr. Missett, as I understand it, the remedy or what you're
10 asking the Court to do in this case is to bar the State from
11 requiring people to vote on BMDs; is that correct?

12 A. Yes. I should add that there should be BMDs available to
13 people with disabilities who can be helped with that kind of
14 assistive technology, which is fairly common to have one in a
15 polling place. But I would think that the security risks
16 should be disclosed to anybody who wants to use one.

17 Q. And then folks could -- if there were folks that still
18 wanted to vote on BMDs, you think that would be fine; correct?

19 A. Yes.

20 MS. LaROSS: Your Honor, I would just like to check
21 with my colleagues.

22 **(There was a brief pause in the proceedings.)**

23 MS. LAROSS: That's all the questions I have,
24 Dr. Missett. Again, a pleasure meeting you.

25 Thank you, Your Honor.

REDIRECT EXAMINATION

BY MR. BROWN:

Q. I have one follow-up question because I misspoke in my question to you, and I just want to clarify that.

You are choosing now to vote by BMD because of difficulties you've had with absentee voting; correct?

A. Yes.

Q. And you testified that you review the BMD ballots; correct?

A. Yes.

Q. But is it correct that it is really that you tried to review them the best you can?

A. Yes.

Q. And for the long ballots, you said it takes several minutes for you to read -- to review even what you can remember.

Is that the sense of it?

A. Yes. Just to process it. I can probably roll my eyes over it in less than a minute. But to really remember what it was, I need a little time.

Q. You testified in cross-examination that you wouldn't catch what you missed?

A. Yeah.

Q. And did you mean that if there was a -- if the BMD didn't capture one of the races or one of the questions you might not

1 ever catch that on the BMD printout; is that right?

2 **A.** That is one of my fears.

3 MR. BROWN: No more questions, Your Honor. Thank you
4 very much.

5 May the witness be excused?

6 THE COURT: Yes. Thank you very much.

7 THE WITNESS: Thank you.

8 MR. McGUIRE: Your Honor, plaintiffs call Dr. Philip
9 Stark who is appearing by Zoom.

10 THE COURT: All right.

11 MR. RUSSO: Your Honor, Ms. Johnston was going to go
12 next.

13 THE COURT: All right.

14 MR. MILLER: It is really a logistical issue. I
15 mean, it is your call, but I don't anticipate Dr. Stark will be
16 finished --

17 MR. RUSSO: We'll let it go.

18 **(There was a brief pause in the proceedings.)**

19 THE COURT: Why don't we just proceed with the live
20 witness, and then we'll start with Professor Stark.

21 MR. McGUIRE: Okay. Professor Stark, we're going to
22 have another witness first.

23 THE COURT: I don't think this will take long.

24 **(There was a brief pause in the proceedings.)**

25 MR. BROWN: Your Honor, in fairness to Mr. Oles, I

1 think we tricked him because we first said Stark, and I think
2 that alert gave him the wrong signal.

3 COURTROOM DEPUTY CLERK: If you would please raise
4 your right hand.

5 **(Witness sworn)**

6 COURTROOM DEPUTY CLERK: Please have a seat. State
7 your name and spell your full name for the record, please.

8 THE WITNESS: My name is Janice Johnston,
9 J-A-N-I-C-E, J-O-H-N-S-T-O-N.

10 Whereupon,

11 JANICE JOHNSTON, MD,

12 after having been first duly sworn, testified as follows:

13 CROSS-EXAMINATION

14 BY MR. OLES:

15 **Q.** Good afternoon, Dr. Johnston. My name is David Oles. I
16 represent the plaintiff -- one of the plaintiffs, Ricardo
17 Davis, in this case.

18 Thank you this -- thank you for taking time this afternoon
19 to answer a few questions for us.

20 Now, you currently are a member of the Georgia State
21 Election Board?

22 **A.** That's correct.

23 **Q.** And how long have you been on the board?

24 **A.** Since March of 2022.

25 **Q.** And as part of the -- I won't ask you to list all of what

1 the State Election Board does.

2 But as part of its duties, is it responsible for
3 investigating complaints regarding the conduct of elections?

4 **A.** Yes, it is.

5 **Q.** Is it also responsible for dealing with complaints
6 regarding voting systems?

7 **A.** It is responsible for investigations with the
8 administration of elections --

9 **Q.** Okay.

10 **A.** -- and election officials.

11 **Q.** Okay. Do you also receive and investigate -- let me
12 rephrase that.

13 As part of that, what you just described, does that also
14 involve consideration of issues regarding the operation of the
15 voting systems?

16 **A.** It could.

17 **Q.** Okay. Thank you.

18 Now, could you briefly describe for the Court the process
19 that the board follows when it receives such a complaint,
20 typically how you would go about initiating an investigation.

21 **A.** A complaint is maybe filed online or by paper to the State
22 Election Board. And once received, it is logged and the State
23 Election Board determines whether a case number is assigned to
24 the alleged violation. And it is then handed over to the
25 Secretary of State investigators for investigation.

1 **Q.** Okay. And does the board's responsibility then end, or
2 does it come back? How does that work?

3 **A.** So the Secretary of State investigators proceed with the
4 investigation. And once they feel like they have completed the
5 investigation, they present it back to the board for a
6 preliminary review and then a plan to present it at a State
7 Election Board meeting.

8 **Q.** Okay. And what would then happen at a State Election
9 Board meeting with regard to such a complaint and
10 investigation?

11 **A.** The investigators then present the -- the complaint, the
12 alleged violation, and their findings. And questions are asked
13 by the State Election Board, and then a determination is made
14 of how to proceed with that complaint.

15 **Q.** Thank you.

16 Does the election board itself have the jurisdiction to
17 make changes to our voting processes?

18 **A.** What do you mean by processes?

19 **Q.** Well, what I'm trying to get at is what authority that
20 the -- that as you understand it, as a board member, what
21 authority the board has to make changes in the method by which
22 Georgia conducts its elections?

23 MR. MILLER: Your Honor, if I may, just briefly.

24 To the extent it is calling for a legal conclusion, I
25 just want to note that objection. I think I have permitted the

1 questions that he's asking about general understanding, but I
2 want to make that clear for the record.

3 THE COURT: All right. Thank you. You made it
4 clear.

5 BY MR. OLES:

6 Q. Go ahead.

7 A. One of the other duties of the State Election Board is to
8 promulgate rules that are consistent with Georgia Election Code
9 for -- to ensure the conduct of legal and fair and true
10 elections. The Secretary of State is the official that is in
11 charge of determining the voting method for the State.

12 Q. Okay. Now, Ms. Johnston, when a complaint is received, is
13 it assigned a number?

14 A. Not necessarily. The complaints that are received may be
15 a little bit like the department store complaint number. We
16 receive a lot of, quote, complaints that are just questions
17 that need information or direction. But if it is a complaint
18 of an alleged violation, if it appears to be such, a case
19 number is assigned.

20 Q. Okay. Now, what I'm particularly interested in here today
21 is whether or not -- while you have been on the board whether
22 or not there have been any complaints received involving the
23 Dominion BMD voting system.

24 THE COURT: I think that is broader than the question
25 you told me you were going to ask, but --

1 MR. OLES: I can rephrase, Your Honor.

2 THE COURT: Okay. Well, you told me about a
3 particular -- a particular complaint. That was 2022-348. That
4 that was what you were -- and that related to a QR code.

5 That is what you indicated you were going to be
6 asking about, and then you also said you were going to be
7 asking about the memory card retention policy.

8 MR. OLES: Okay. Thank you, Judge. I'm happy to
9 rephrase. I was simply trying to establish the general method
10 that they go about doing this.

11 THE COURT: All right.

12 BY MR. OLES:

13 **Q.** Ms. Johnston, I'm going to ask you specifically with
14 regard to a complaint I believe has been received by the board.
15 It goes under the number SEB 2022-348, and it involves an issue
16 with the QR code -- a signature -- QR code signature mismatch
17 error.

18 Are you familiar with that?

19 **A.** I am familiar with that.

20 **Q.** Can you describe for the Court what the issue was in that
21 complaint?

22 MR. MILLER: Your Honor, I'll object on the basis of
23 hearsay as to whatever is contained in those complaints. We
24 don't presently have a document as to what is coming in, but to
25 the extent that the --

1 THE COURT: Well, do you actually have a complaint
2 there that we can --

3 MR. OLES: I do not have a copy of that one here
4 today, Judge.

5 THE WITNESS: I don't have a copy of it either here
6 today.

7 BY MR. OLES:

8 Q. Well, has the -- do you recall such a complaint involving
9 a QR code signature mismatch error?

10 A. I recall that complaint.

11 Q. Okay.

12 A. And it is currently under investigation.

13 Q. Do you recall what was being alleged?

14 MR. MILLER: Your Honor, I object on the same basis
15 again of hearsay as to whatever is contained in the complaint.
16 If the findings are clear that the -- what Mr. Oles is trying
17 to elicit is about a complaint existing and not the truth of
18 that complaint, then we can proceed. But I want to lodge that
19 objection.

20 THE COURT: All right. What does the complaint
21 allege, whether it is true or not at this point, or partially
22 true or not?

23 Apparently, somebody has it there, your client.

24 You need to show it to defense counsel first.

25 MR. MILLER: Is this a copy for us, or is this the

1 only copy?

2 MR. OLES: That is the only copy I have. I apologize
3 for that.

4 BY MR. OLES:

5 **Q.** Ms. Johnston --

6 MR. OLES: May I approach, Judge?

7 THE COURT: Yes.

8 BY MR. OLES:

9 **Q.** I'm going to show you what I have marked as Davis
10 Exhibit 10 for identification.

11 Can you identify that document?

12 **A.** I see Davis 10 written on the lower right corner.

13 **Q.** Excuse me?

14 **A.** Yes. I see.

15 **Q.** Oh, yeah. No. Can you -- do you know what that document
16 is?

17 Perhaps I should rephrase.

18 Can you recognize that as a copy of the complaint that was
19 received that is now traveling under the number SEB 2022-348?

20 **A.** Give me just a minute, please.

21 Mr. Oles?

22 **Q.** Yes.

23 **A.** The first sheet of this complaint looks familiar. But the
24 subsequent pages, I really don't recognize.

25 **Q.** Okay. So as we sit here today, you don't believe that you

1 are familiar with that document other than the first page?

2 **A.** I'm familiar with the complaint from Mr. Moncla and
3 Mr. Cross about a Williamson effect QR code problem.

4 **Q.** Okay.

5 **A.** Okay.

6 **Q.** And --

7 MR. CROSS: Mr. Oles, sorry to interrupt.

8 I just want to make sure the Judge understands. This
9 is not me. I think we talked about this before. There is
10 another David Cross who I apparently understand works at the
11 Georgia GOP, just so we are clear.

12 THE COURT: Where does that person work? Where does
13 that other David Cross work?

14 MR. CROSS: I think he is associated with the Georgia
15 GOP. I'm not sure.

16 THE WITNESS: David Cross?

17 MR. OLES: He is also David Cross.

18 MR. CROSS: There is a comedian too. I don't know --

19 MR. MILLER: I'm more familiar with the actor.

20 MR. CROSS: That is a dagger to the heart, Carey.

21 **(There was a brief pause in the proceedings.)**

22 BY MR. OLES:

23 **Q.** Ms. Johnston, my question is simple.

24 What is your understanding -- do you have an understanding
25 of the complaint that is being alleged in that document from

1 Mr. Cross?

2 MR. MILLER: Your Honor, I'm not sure if the exhibit
3 has been tendered or is intended to be tendered, but right now
4 the witness has authenticated the first page and doesn't know
5 what the rest of it is, but if we're getting into the --

6 THE COURT: Why don't you tell us what the first page
7 is. And I don't know -- if you're not familiar with the other
8 pages, I don't think that you can authenticate them.

9 THE WITNESS: Yes. So the first page is a complaint
10 about a Democracy Suite 5.5-A election equipment that did not
11 appear to perform as expected and errors -- allegedly, errors
12 were found and found in more than one county.

13 BY MR. OLES:

14 Q. According to the process you've described, does this reach
15 a level where the board felt that the issues being alleged were
16 important enough to go ahead and assign a number to have it
17 investigated?

18 MR. MILLER: Your Honor, just for clarity, is the
19 document in evidence or being moved into evidence? The witness
20 has it and is being asked to read it off. I just want to make
21 sure at the appropriate time I make the objections.

22 THE COURT: Are you tendering it into evidence at
23 this time?

24 MR. OLES: Yes.

25 THE COURT: Could I see it?

1 MR. MILLER: And, Your Honor, in addition to an
2 authentication problem beyond the first page, again, the
3 hearsay as to the truth --

4 THE COURT: I'm just looking at the first page. She
5 couldn't identify the other pages, so they are not going to be
6 introduced.

7 MR. MILLER: Thank you, Your Honor.

8 And, Your Honor, I believe that is the only copy. So
9 just so we're clear, it is that first page that is with you,
10 that you have got the whole stack.

11 THE COURT: Well, I'm a little bit confused. The
12 first page is a page of a very substantial long complaint.

13 But you're only familiar with the way that the first
14 page reads or --

15 THE WITNESS: Yes. There may be more on that second
16 page.

17 THE COURT: Okay. Because it looks like it is a
18 multipage complaint, and then it has documents attached to it.

19 Are you just familiar with the first and second page?
20 Is that what you are saying?

21 THE WITNESS: That's correct.

22 THE COURT: Okay. So do you think that the back page
23 of this you're also -- you are also familiar with?

24 Let me just have it -- just look at the back side of
25 the front page.

1 THE WITNESS: Your Honor, I am -- I am familiar with
2 a case that is 358 -- 2122-358 [sic].

3 BY MR. OLES:

4 **Q.** 348?

5 **A.** 348. That alleges there were errors with the Dominion
6 Democracy Suite 5.5-A. I cannot -- and it is a case that was
7 to be presented last month at the State Election Board, and the
8 IT representative Michael Barnes was supposed to be there to
9 answer questions and did not appear, so the case was continued.
10 And it is still considered an active case, so I really can't
11 speak to much more than that.

12 And -- and I really don't recall all of these documents.

13 **Q.** Dr. Johnston, the complaints that are filed with the State
14 Election Board, those are public documents; correct?

15 **A.** They are.

16 **Q.** Okay. But the details of the investigation are
17 confidential until it has been completed; is that --

18 **A.** That's correct.

19 **Q.** So just -- as far as just the complaint itself, can you
20 describe for the Judge your understanding of what is being
21 alleged in the complaint as the problem with the Dominion
22 Democracy Suite, if you can?

23 MR. MILLER: Your Honor, again, just as to the
24 objection to hearsay, we're talking about an allegation. If it
25 is not coming in for the truth, it is not an issue. But right

1 now, I think that is the path we're going down, so I want to be
2 clear on that.

3 MR. OLES: Judge, I'm just trying to establish that
4 is a complaint that has been lodged before the board --

5 THE COURT: I think the witness did a very good job
6 at summarizing that there was -- what the nature of the
7 complaint was and that it was, in fact, filed. And I don't
8 know that she has more information than that at this point.
9 That is why they were waiting for Mr. Barnes to come and talk
10 to them, I guess.

11 And they probably had other information too, but they
12 hadn't reviewed it altogether; is that correct?

13 THE WITNESS: Correct. We had -- or I had questions
14 that Mr. Barnes needed to answer because they are technical in
15 nature and technical questions that the investigators were not
16 comfortable or able to answer.

17 MR. MILLER: Your Honor, this gets into a separate
18 issue that I want to be careful with the witness as to the
19 deliberative process privilege of this matter that is going to
20 come before the State Election Board.

21 THE COURT: I don't think that she's even gotten
22 close. But anyway, I think that basically because they have
23 not reviewed it yet and she's identified that, yes, this is
24 before the board, I don't know that there is more that you can
25 elicit at this juncture.

1 MR. OLES: All right, Judge.

2 THE COURT: And I -- because the witness has
3 identified the complaint is indeed in front of them, I'm not
4 sure you need -- the one page -- the document which is
5 incomplete. It wouldn't make sense at this juncture because
6 she says she only recognizes the front page and the back page
7 of what you have given her, and it is a long document.

8 So I don't think -- and it is -- I mean, you've
9 established that the complaint has been filed and the nature of
10 the complaint. I don't think we can gather because of hearsay
11 any more information about it.

12 But you have established that the complaint was
13 filed. I can take notice that it is a substantial -- it is a
14 long complaint from the number of pages. But we don't have --
15 you know, you could have -- the author could have come.

16 But anyway, it is clear that it is before the board
17 and the nature of the complaint.

18 MR. OLES: All right.

19 BY MR. OLES:

20 Q. Ms. Johnston, I want to ask you about one other matter.

21 Are you aware of any -- any complaints or questions that
22 have come before the board regarding memory card retention
23 policies?

24 A. Any complaints?

25 Q. Has the memory card retention policy been an issue before

1 the board?

2 **A.** There are some complaints that have come -- have not come
3 before the board, but there are some complaints that have been
4 sent to the board about memory card processes.

5 **Q.** Okay. And is there anything that comes to mind about --
6 are there -- can you explain further about what may be coming
7 before the board with respect to the memory cards?

8 **A.** Yes. There is a complaint. I don't know the outcome of
9 whether a case number has been assigned to a complaint -- to
10 this complaint, but there was a complaint that memory cards
11 were removed from their scanner tabulators and tabulated on
12 different scanner tabulators in an election.

13 **Q.** Okay.

14 MR. BROWN: Your Honor, the plaintiffs would lodge an
15 objection under Rule 403 as this is a waste of time because
16 this does not have anything to do with the lawsuit.

17 THE COURT: Well, I'm going to -- two questions more
18 to try to clarify where this is at and what you're trying to
19 get at. And then we're going to --

20 BY MR. OLES:

21 **Q.** Ms. Johnston, the issues with the memory cards, are
22 these -- to your understanding, are these issues that are
23 alleged to affect the accuracy of the voting system or the
24 accuracy of vote counts?

25 **A.** The issue with memory cards is they are part of the

1 election documents, and there is a prescribed method for how to
2 handle and how to treat and how to retain election documents so
3 that, if needed, the election can be audited or the results
4 reviewed and checked.

5 So memory cards that hold thousands of votes are very
6 important.

7 Q. And can you say what is being alleged about the handling
8 of those cards and how it may affect the accuracy of the
9 system?

10 MR. MILLER: Objection, Your Honor. I'm not sure we
11 have even established that there is like a single complaint
12 that we're talking about here as far as the allegations that
13 she's aware of. If they want to provide some specificity;
14 otherwise, it seems the foundation of speculation as to
15 complaints that she may have seen at some point in time.

16 THE COURT: I'm just trying to move through this,
17 gentlemen and ladies, with due respect to the witness and
18 everyone else's time.

19 So is this something that is under review, this
20 issue?

21 THE WITNESS: I know the complaint has been filed. I
22 don't know the outcome of the complaint.

23 THE COURT: Okay. All right. Thank you very much.

24 I don't think that there is more we can elicit at
25 this point because it is still -- she doesn't know that it has

1 been resolved and that it is a serious issue. And that is what
2 she has noted.

3 MR. OLES: All right. Thank you, Judge. I have
4 nothing further then.

5 THE COURT: Thank you.

6 Was there any further examination?

7 MR. CROSS: Very briefly, Your Honor.

8 MR. MILLER: Your Honor, I just want to note a short
9 objection because we had come to an agreement on a stipulation
10 that deposition excerpts were being submitted in order to
11 release Dr. Johnston from the subpoena.

12 THE COURT: I see.

13 MR. MILLER: Right now, we're in a situation where I
14 guess we're doing both, and in which instance Mr. Brown's
15 403 objection seems pretty acutely accurate on cumulativeness.

16 THE COURT: All right. Let me just remind you, the
17 State felt very -- articulated very clearly to me when we dealt
18 with the question of additional substitute representative that
19 I would be -- that it would be an error not to allow Mr. Davis
20 to have separate counsel, and it can't be just completely that
21 he never gets to ask a question. That is why I have tried to
22 honor that.

23 It doesn't mean that this is the position of the
24 plaintiffs who had asked for it to be in -- have the deposition
25 excerpt. So I just -- I'm trying to balance, moving forward

1 and accomplishing what everyone viewed as a legal obligation on
2 the part to allow Mr. Davis to have counsel and at the same
3 time not disrupt this trial.

4 MR. MILLER: And I understand, Your Honor. And for
5 clarity, I did not lodge that objection with Mr. Davis' counsel
6 because Mr. Davis' counsel, unbeknownst to us, was not a part
7 of that agreement. You know, who was a part of that agreement
8 were the Curling and Coalition plaintiffs.

9 THE COURT: Well, the agreement was reached,
10 obviously, way before his appearance.

11 MR. MILLER: Sure, yeah. Actually, I'm sorry, Your
12 Honor. I think that agreement was reached just yesterday.

13 THE COURT: As to --

14 MR. MILLER: As to releasing Dr. Johnston.

15 THE COURT: Right. I understand that. I understand
16 that. But obviously, there was a person who didn't agree, so
17 I'm trying to deal with that. And more discussion of it is
18 only going to consume more time.

19 So what is your question, and is it going to consume
20 time that is not necessary?

21 MR. CROSS: No. It is going to be very quick, Your
22 Honor.

23 CROSS-EXAMINATION

24 BY MR. CROSS:

25 Q. Dr. Johnston, you are familiar with the CISA advisory that

1 came out that identified certain mitigation measures to be
2 taken in Georgia as soon as possible to address certain
3 vulnerabilities; right?

4 **A.** Yes.

5 **Q.** And --

6 THE COURT: Is this stuff that you asked during your
7 deposition?

8 MR. CROSS: No. No, these are not in the
9 designations.

10 Go ahead.

11 BY MR. CROSS:

12 **Q.** You're not aware of any measures --

13 MR. MILLER: Your Honor, I -- just so I can note, I
14 think this was covered in the deposition. I'm not sure if it
15 is in the designations or not, but --

16 MR. CROSS: It is not in the designations. This is
17 going to be real quick. We would be done by now.

18 THE COURT: Just go ahead and I will look later.
19 Thank you.

20 BY MR. CROSS:

21 **Q.** You're not aware of any mitigation measures that were
22 taken on behalf of the State with respect to the CISA advisory;
23 right?

24 **A.** I think there were about 12 recommended mitigations in the
25 CISA advisory.

1 Q. And do you recall testifying in a deposition?

2 A. I don't recall.

3 Q. Do you recall testifying under oath that you were not
4 aware of any mitigation measures that were implemented in the
5 State that were arising under the CISA advisory, yes or no?

6 A. I don't recall.

7 Q. Well, as you sit here today, you can't direct us to any
8 mitigation measures that have been taken by the State with
9 respect to those advised by CISA; is that right, ma'am?

10 A. Ask your question again, please.

11 THE COURT: No. I think that's overreaching at this
12 juncture. I mean, you decided -- you agreed not to call her
13 and to rely on the deposition, and so I think we've gone as far
14 as we can go.

15 MR. CROSS: Okay.

16 THE COURT: Because, I mean, that was the agreement.
17 I'll let the record continue as it is, but --

18 MR. CROSS: Understood, Your Honor.

19 THE COURT: -- that is it.

20 Do you have any questions?

21 MR. MILLER: Your Honor, I've got just two brief
22 questions.

23 THE COURT: All right.

24 DIRECT EXAMINATION

25

1 BY MR. MILLER:

2 Q. Good afternoon, Dr. Johnston.

3 A. Good afternoon.

4 Q. I think you mentioned earlier, but when were you appointed
5 to the State Election Board?

6 A. March of 2022.

7 Q. And you've been asked about various complaints that the
8 SEB may receive; right?

9 A. Yes.

10 Q. When those complaints come before the board, those are
11 accompanied by investigative materials and substantive
12 information that you consider; right?

13 A. Correct.

14 Q. And, Dr. Johnston, when those matters come before you, do
15 you take your job seriously in evaluating the substance of
16 that?

17 A. Absolutely.

18 Q. And why is that, that you take that job seriously?

19 A. Well, I took an oath to perform this job with my greatest
20 care and ability.

21 Q. Thank you, Dr. Johnston.

22 A. Thank you.

23 THE COURT: All right. You're excused at this time.
24 Thank you very much. Sorry that you had to wait so long.

25 Just curious, you are a doctor of -- in what field?

1 THE WITNESS: OB-GYN.

2 THE COURT: OB-GYN.

3 Well, we're glad that we have you in here.

4 THE WITNESS: Yes.

5 THE COURT: Yes, I know. Very glad that you were
6 here in case you had to soothe his anxiety at some point.

7 THE WITNESS: I tried to reassure him.

8 THE COURT: Very good.

9 MR. MILLER: Your Honor, she was prepared in the
10 break room.

11 THE COURT: I am so glad.

12 MS. LaROSS: She was ready to tell him that his wife
13 could have the baby without him, in her expert opinion.

14 THE COURT: That's very good. I'm so relieved.
15 Maybe she will come back for some other -- for a more dramatic
16 trial.

17 All right. Who is your next witness now?

18 MR. BROWN: Your Honor, in terms of scheduling, we
19 would be fine if we played the Gilbert video. And then if
20 there are matters that Your Honor needs to resolve with counsel
21 about the Persinger issue, to resolve those today, and then
22 pick up on Monday when everybody is fresh with Mr. Skoglund and
23 Dr. Stark.

24 THE COURT: And they are both available?

25 MR. BROWN: They are both available.

1 THE COURT: All right. Because I know that Dr. --
2 that one of your witnesses -- expert witnesses is in
3 California.

4 MR. BROWN: Right, Your Honor. We've checked.
5 However, sometimes it is better to power on through. We can do
6 that too. It is simply up to Your Honor.

7 THE COURT: You would like me to not power ahead.
8 All right.

9 MR. BROWN: Mr. Miller is tired too.

10 MR. MILLER: It is only my first week, and I'm
11 already worn out, Your Honor.

12 THE COURT: Well, I just wrote a note to my law clerk
13 saying I'm going to have to go out and get some Advil, so --
14 okay.

15 Really, since I overpowered the court reporter
16 yesterday in going -- continuing, I will not do that today
17 since it is Friday.

18 So we'll do -- what did you say we were going to do?

19 MR. BROWN: We're going to do the video, the short
20 video.

21 THE COURT: Okay. The video. We'll do the video and
22 a little conference with those counsel who are affected by the
23 dispute as to Dr. -- as to Mr. Persinger.

24 I need about ten minutes to work with my client -- my
25 clients -- my law clerks before we have that conference,

1 though.

2 MR. SCHEINMAN: Thank you, Your Honor.

3 At this time, the plaintiffs would like to play a
4 short excerpt from the video deposition of Dr. Juan Gilbert,
5 one of the State's experts in this case. It will run about
6 ten minutes long.

7 THE COURT: All right. Is it a number of different
8 spots?

9 MR. SCHEINMAN: Your Honor, I have a clip report that
10 I can offer you.

11 THE COURT: If you could offer it to the court
12 reporter. At least if she's not going to take it down, which
13 she doesn't, then she can record what -- what parts are being
14 included in that. That's useful to have.

15 MR. BEDARD: Your Honor, while we're doing that, I
16 can't remember if this clip report will say it or not, Ramsey,
17 but we did have some objections to some of the questions, I
18 believe. There have been a lot of deposition designations that
19 have been exchanged.

20 For the sake of court time, we're not going to deal
21 with those now. I think those are included in whatever list is
22 being provided to you. So at the Court's convenience, if you
23 can feel free to rule on those whenever it is convenient to
24 you, but we don't want to take up court time dealing with those
25 now.

1 THE COURT: So as I'm looking at this, are these --

2 MR. SCHEINMAN: Your Honor, each party's
3 designations, counter-designations, and objections are
4 contained in a master list that we will be providing.

5 THE COURT: You mean the one you just handed --
6 something else.

7 What exactly is this? Is this the designations?

8 MR. SCHEINMAN: That is a clip report that reflects
9 the transcript excerpts from the video we would like to play
10 now.

11 MR. BEDARD: Aaron, does this include the counters
12 too?

13 MR. SCHEINMAN: Yes.

14 MR. BEDARD: So, I think, Your Honor, when you get
15 the final -- if I understand this right -- it will include
16 something that's clear about what's a designation versus a
17 counter-designation. I don't think this does yet, but my
18 understanding is I think plaintiffs will be submitting
19 something that does.

20 THE COURT: All right. Well, then I'm going to give
21 this back. I would rather have a complete one, and I don't
22 know where we're going to put it, but we'll figure it out.
23 We'll file it or something.

24 MR. SCHEINMAN: Thank you, Your Honor.

25 **(The videotaped deposition clips of JUAN**

1 **GILBERT PH.D. was played in open court.)**

2 THE COURT: Okay. And is the rest of the deposition
3 also submitted or not, or is the doctor going to be testifying
4 for the State?

5 MR. MILLER: Dr. Gilbert will be testifying in our
6 case, Your Honor.

7 THE COURT: He will be?

8 MR. MILLER: Yes, Your Honor.

9 MR. FISHER: To be clear, Your Honor, we have
10 additional designations that we're going to submit to the
11 Court. We spoke with counsel. We are going to handle all of
12 our deposition designations and corresponding exhibits on
13 Monday at the close of our case.

14 THE COURT: All right.

15 Okay. Well, other than counsel involved in the
16 issues relating to defense counsel's consulting expert,
17 we'll -- that is what remains today. I'll take a 15-minute
18 break so I can talk adequately to my colleagues in chambers
19 about this, and then we will -- I'll come back out here and
20 meet with you.

21 So everyone has 15 minutes who is not involved to
22 clear off. And so otherwise, we are done for the day and
23 beginning on Monday at 9:30.

24 And, Counsel, you have an issue that you want to
25 raise, Mr. Oles?

1 MR. OLES: Yes, Judge.

2 THE COURT: Yes.

3 MR. OLES: When my client Ricardo Davis was on the
4 stand the other day, there were two documents that were
5 referenced. The Court offered us an opportunity to place them
6 into the record. We have them here today. If I could briefly
7 put up my client to have him identify these documents, and then
8 I can move them into the record.

9 THE COURT: All right. Go ahead.

10 MR. OLES: Thank you.

11 Mr. Davis, would you go to the stand, please.

12 THE COURT: All right. Everyone be quiet because
13 we're just trying to finish off this last witness.

14 I just wanted to remind you, Mr. Davis, you're still
15 under oath. Thank you.

16 THE WITNESS: Yes. And thank you for your patience.

17 Whereupon,

18 RICARDO DAVIS,

19 after having been previously duly sworn, testified as
20 follows:

21 REDIRECT EXAMINATION (Further)

22 BY MR. OLES:

23 Q. Good afternoon, Mr. Davis. You are still under oath.

24 A. Yes.

25 Q. When we were last here, you were describing for the Court

1 two documents that you were offering in support of your -- your
2 own testimony as to the efforts that you and your organization
3 have taken to study several issues.

4 MR. OLES: If I may approach, Judge?

5 THE COURT: Yes.

6 BY MR. OLES:

7 Q. Mr. Davis, if you would please take a look at the first
8 document that I have identified as Davis 7.

9 A. Okay. I have a Davis 8 and a Davis 9.

10 Q. All right. Davis 8. I'm sorry.

11 A. Okay.

12 Q. Can you identify that document, please?

13 A. Okay. This document is essentially the minutes of the
14 July 14, 2020, meeting of the DeKalb County Board of Elections.

15 Q. Okay. And to what issue does this document have
16 importance?

17 A. Well, this addresses the concern I brought out -- brought
18 up with regard to the DeKalb County Commission 2 race where
19 there were serious problems with the tabulation of the votes
20 for one of the candidates. And after a thorough hand-count
21 audit, we found that there were serious problems with the
22 machine which the board could not rectify with technical
23 assistance.

24 Q. Okay. And where did this document come from?

25 A. This came from the DeKalb County website.

1 Q. Okay. And did you -- you downloaded this document?

2 A. Yes, I did.

3 Q. And it is as published by DeKalb County Board of
4 Elections?

5 A. Okay. Let me read through it real quick to make sure that
6 what you have here is --

7 THE COURT: Well, let me make life easy.

8 Are the defendants asking that this be certified, or
9 are you going to accept this version of the --

10 MR. RUSSO: Your Honor, this is the first we've seen
11 this document, so I don't know that he can authenticate it. I
12 realize there is a public records exception that they may try
13 to rely on, but that is also limited under 803.

14 So I just haven't had a chance to fully review the
15 document yet to know whether it is -- could be a public record
16 and qualify under the exception to hearsay. Otherwise, we
17 would object to it being hearsay.

18 MR. CROSS: We join in that objection, Your Honor.
19 There is no notice of this. This just came out of the blue.
20 This is not the way to do things. I have no idea what this is.

21 THE COURT: What is your second document that you
22 want him to identify?

23 BY MR. OLES:

24 Q. Can you -- what is the second document, Ricardo?

25 A. The second document was a presentation by VOTER GA with

1 regard to a number of the issues that we found with regard to
2 analysis of the data in the 2020 election.

3 **Q.** Okay. And this document that -- you participated in the
4 preparation of this document?

5 **A.** I participated in helping coordinate the volunteers that
6 were used -- that essentially performed the research.

7 **Q.** And this was prepared under -- and you, of course, are the
8 head?

9 **A.** Well, I'm cofounder of the organization, yes.

10 **Q.** And this is presenting the results of your organization's
11 evaluation of the issue?

12 **A.** That's correct.

13 **Q.** And which issue was that?

14 **A.** Well, there were a number of issues, but essentially, what
15 we're doing --

16 MR. CROSS: Your Honor, I'm going to object at this
17 point. There is no way this is admissible. I mean, this is
18 something that someone in the organization -- presumably,
19 Garland Favorito because he pasted his face on the cover --
20 prepared. It is his name on it, in fact, as the author. And
21 this is some kind of presentation that not only has nothing to
22 do with this case, but it is hearsay. There is no foundation
23 for it.

24 There is a ton of analysis in here that looks like
25 maybe it is a back door for expert. It wasn't on the pretrial

1 order. We have never seen this. We would ask the Court to
2 shut this down, please.

3 MR. OLES: Well, as far as the pretrial order goes,
4 Judge, you know that that was arranged by counsel prior to my
5 coming into the case, and I asked for that to be amended. But
6 counsel, of course, objected to that having been done, so there
7 was no opportunity to do it.

8 This is being offered to supplement my client's
9 testimony that, in fact, this organization conducted this
10 analysis. He has already testified at length about the results
11 of the analysis.

12 THE WITNESS: That's correct.

13 MR. OLES: This is only being offered to show that
14 this was a legitimate effort undertaken by his organization.

15 THE COURT: Okay. Well, he has tendered it. He has
16 identified it. I will take a look at it. I will consider the
17 objections, and on Monday, I'll rule on it. Okay.

18 MR. OLES: Thank you, Judge.

19 MR. CROSS: One quick thing, just so the record is
20 clear.

21 The only change that was proposed by Mr. Oles to the
22 pretrial order, as I recall, was to add two witnesses and some
23 deposition designations. This was never suggested. And the
24 fact that he did file a motion shows that he had a fair
25 opportunity to suggest this. Your Honor's ruling, of course,

1 was affirmed on appeal when they appealed that, so he has had
2 plenty of time to do this.

3 THE COURT: All right.

4 MR. RUSSO: Your Honor, I just simply want to note
5 that State defendants had requested in discovery documents from
6 VOTER GA, and we were not allowed to get those documents, so, I
7 mean, I'll join in the objection. I think there is, of course,
8 hearsay all throughout this document. At the same time, we
9 also recognize that other organizational documents have been
10 able to come in with plaintiffs.

11 THE COURT: All right. I heard your objections, and
12 if you wish to make -- keep a record of -- Counsel, if you end
13 up wanting to substitute a certified copy for the election --
14 for whatever the minutes were from DeKalb County, that would
15 probably at least preserve this more clearly.

16 MR. OLES: We will -- I will certainly follow up on
17 that, Judge. I can say that the certified copy, because they
18 had not yet been approved, this is the version that was
19 offered, but I can certainly do that.

20 THE COURT: Okay. All right. Thank you, sir.

21 May the witness stand down?

22 And then if you get -- get me a copy of the two
23 exhibits, I will take a look at them. Thank you.

24 MR. OLES: Thank you, Judge.

25 THE COURT: Thank you.

1 Did you have a copy that wasn't -- so that I'm not
2 taking the last copy available? Is this your only copy?

3 MR. OLES: That and everybody else in the room.

4 MR. BROWN: We have copies.

5 MR. CROSS: We have copies.

6 THE COURT: All right. Very good. That's good.

7 All right. Thank you.

8 Was there anything else I need to address?

9 All right. So I'll see you, those who are dealing
10 with Mr. Persinger, at 5:00 in here. Everyone else is excused.
11 Thank you.

12 COURTROOM SECURITY OFFICER: All rise.

13 **(The public proceedings were adjourned**
14 **concluded at 4:47 PM.)**

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C E R T I F I C A T E

UNITED STATES OF AMERICA
NORTHERN DISTRICT OF GEORGIA

I, SHANNON R. WELCH, RMR, CRR, Official Court Reporter of the United States District Court, for the Northern District of Georgia, Atlanta Division, do hereby certify that the foregoing 207 pages constitute a true transcript of proceedings had before the said Court, held in the City of Atlanta, Georgia, in the matter therein stated.

In testimony whereof, I hereunto set my hand on this, the 19th day of January, 2024.

Shannon R. Welch

SHANNON R. WELCH, RMR, CRR
OFFICIAL COURT REPORTER
UNITED STATES DISTRICT COURT

<p>BY MR. ANDREU-VON EUW: [12] 111/24 113/13 114/8 115/4 115/14 120/8 124/13 125/20 126/2 126/18 127/21 128/25</p> <p>BY MR. BROWN: [3] 152/19 157/13 174/2</p> <p>BY MR. CROSS: [3] 192/24 193/11 193/20</p> <p>BY MR. MILLER: [1] 194/25</p> <p>BY MR. OLES: [14] 176/14 179/5 180/12 181/7 182/4 182/8 183/22 184/13 186/3 188/19 189/20 201/22 202/6 203/23</p> <p>BY MR. TYSON: [41] 7/11 12/11 13/23 19/23 21/8 22/21 25/3 29/1 29/22 35/20 40/7 45/14 48/21 51/3 51/14 51/20 53/22 57/21 62/10 66/21 70/7 71/14 79/7 79/20 80/17 84/5 87/9 89/14 91/1 92/19 94/6 97/8 97/21 101/12 102/14 103/5 105/24 106/11 130/21 131/11 133/25</p> <p>BY MS. LAROSS: [6] 158/17 162/6 170/2 170/15 171/13 173/8</p> <p>BY THE COURT: [1] 134/19</p> <p>COURT REPORTER: [4] 145/25 149/11 157/3 157/7</p> <p>COURTROOM DEPUTY CLERK: [4] 152/6 152/9 176/3 176/6</p> <p>COURTROOM SECURITY OFFICER: [3] 53/18 83/13 207/12</p> <p>MR. ANDREU-VON EUW: [28] 11/20 51/11 78/7 78/17 79/10 88/24 89/5 101/4 111/19 113/3 113/8 113/12 115/2 115/12 124/4 124/12 126/13 126/16 127/18 128/21 128/24 129/7 129/16 129/22 130/11 134/14 139/20 139/23</p> <p>MR. BEDARD: [3] 198/15 199/11 199/14</p> <p>MR. BROWN: [29] 133/17 144/2 145/21 145/24 146/3 147/23 148/2 148/5 148/19 149/2 149/15 149/19 150/2 150/20 150/24 151/2 152/4 158/15 161/15 171/1 175/3 175/25 189/14 196/18 196/25 197/4 197/9 197/19 207/4</p> <p>MR. CROSS: [59] 6/5 6/11 36/19 36/21 37/4 37/7 38/15 39/10 39/14 39/16 39/19 39/23 40/3 79/22 80/6 104/1 104/3 105/8 111/8 111/11 111/15 128/23 140/1 140/10 142/10 142/14 142/17 142/21 143/13 143/16 143/23 143/25 144/3 144/5 144/23 145/7 145/9 145/12 145/15 145/18 149/3 150/4 150/9 150/15 150/21 183/7 183/14 183/18 183/20 191/7 192/21 193/8 193/16 194/15 194/18 203/18 204/16 205/19 207/5</p> <p>MR. FISHER: [1] 200/9</p> <p>MR. McGUIRE: [5] 140/7 140/15 140/21 175/8 175/21</p> <p>MR. MILLER: [25] 148/14 175/14 178/23 180/22 181/14 181/25 183/19 184/2 184/18 185/1 185/7 186/23 187/17 190/10 191/8 191/13 192/4 192/11 192/14 193/13 194/21 196/9 197/10 200/5 200/8</p>	<p>MR. OLES: [55] 5/18 6/1 6/23 140/22 141/5 141/10 141/17 141/21 142/3 142/5 142/12 142/16 142/18 142/22 142/25 143/7 143/19 143/24 144/1 144/19 144/25 145/3 145/8 145/10 145/23 146/6 146/8 146/16 146/23 147/1 147/18 148/21 151/4 151/9 180/1 180/8 181/3 182/2 182/6 183/17 184/24 187/3 188/1 188/18 191/3 201/1 201/3 201/10 202/4 205/3 205/13 205/18 206/16 206/24 207/3</p> <p>MR. RUSSO: [16] 143/14 143/17 145/16 147/6 147/22 148/10 148/17 148/20 149/5 149/13 149/24 150/3 175/11 175/17 203/10 206/4</p> <p>MR. SCHEINMAN: [10] 151/14 151/20 151/23 152/2 198/2 198/9 199/2 199/8 199/13 199/24</p> <p>MR. TYSON: [85] 5/5 5/11 5/16 11/22 19/20 21/3 21/5 22/19 35/15 36/24 37/6 37/19 37/21 39/7 39/11 39/15 39/17 39/22 39/24 40/4 44/17 44/19 45/2 45/11 51/1 51/9 53/11 53/17 61/18 61/23 62/7 65/18 78/9 78/22 79/6 79/15 79/25 80/8 80/15 82/11 82/16 82/19 82/24 83/1 83/11 83/16 83/22 84/2 84/4 88/20 89/13 90/24 96/25 97/7 101/6 102/10 102/21 103/24 104/2 105/15 105/19 105/21 105/23 106/9 107/18 107/22 108/10 111/1 112/24 113/19 124/1 124/7 126/11 126/14 128/10 129/8 129/19 130/6 130/10 130/17 133/19 134/13 139/19 146/18 151/10</p> <p>MS. LAROSS: [13] 161/19 162/3 169/25 170/12 170/24 171/4 171/11 172/20 173/1 173/4 173/20 173/23 196/12</p> <p>THE COURT: [249]</p> <p>THE WITNESS: [58] 13/18 23/23 28/20 29/17 35/16 48/20 53/15 57/14 65/13 65/23 65/25 66/3 66/8 68/7 68/22 70/25 71/4 71/7 71/12 79/19 80/13 86/11 87/3 87/7 92/18 93/2 93/6 93/13 93/15 93/23 102/22 113/21 113/25 119/18 123/25 131/10 133/23 152/12 157/5 157/9 162/5 170/18 170/21 175/7 176/8 181/5 183/16 184/9 185/15 185/21 186/1 187/13 190/21 196/1 196/4 196/7 201/16 205/12</p> <p>'</p> <p>'21 [4] 44/22 44/24 45/8 54/18</p> <p>'22 [2] 23/11 155/3</p> <p>'</p> <p>...CONT'D [2] 2/25 3/1</p> <p>.32 [1] 117/6</p> <p>0</p> <p>025 [1] 141/23</p> <p>1</p> <p>10 [3] 121/22 182/10 182/12</p> <p>100 percent [2] 91/12 93/5</p> <p>11:19 [1] 53/20</p> <p>12 [3] 54/13 148/17 193/24</p> <p>12 person [1] 54/12</p> <p>1228 [1] 97/10</p>	<p>1231 [3] 51/5 51/10 55/8</p> <p>12:30 [1] 82/14</p> <p>1383 [1] 1/25</p> <p>14 [1] 202/14</p> <p>14 percent [4] 125/1 125/4 125/7 125/8</p> <p>15 [1] 121/22</p> <p>15 minutes [2] 83/1 200/21</p> <p>15-minute [1] 200/17</p> <p>159 [1] 18/15</p> <p>16 [1] 97/10</p> <p>19 [2] 1/13 5/2</p> <p>198714 [1] 109/7</p> <p>1996 [4] 153/13 159/15 159/20 160/25</p> <p>19th [1] 208/13</p> <p>1:17-CV-2989-AT [1] 1/6</p> <p>1:20 [1] 83/9</p> <p>1st [4] 14/12 35/15 44/1 44/5</p> <p>2</p> <p>2016 [11] 94/22 134/21 135/2 135/8 136/14 136/20 137/4 160/12 160/18 160/25 161/1</p> <p>2017 [4] 135/10 135/17 135/23 153/3</p> <p>2019 [1] 16/13</p> <p>2020 [16] 34/22 82/8 84/7 84/25 85/4 100/2 100/4 100/11 108/1 141/25 163/1 163/10 163/11 164/15 202/14 204/2</p> <p>2021 [9] 23/11 36/9 42/20 84/14 85/10 85/13 137/9 163/4 164/17</p> <p>2022 [8] 10/16 25/7 25/10 109/5 109/6 156/4 176/24 195/6</p> <p>2022-348 [5] 142/6 145/3 180/3 180/15 182/19</p> <p>2023 [1] 16/22</p> <p>2024 [5] 1/13 5/2 100/7 101/1 208/13</p> <p>207 [1] 208/9</p> <p>2122-358 [1] 186/2</p> <p>215-1383 [1] 1/25</p> <p>22 months [1] 146/11</p> <p>22.7 percent [1] 91/7</p> <p>2394 [1] 1/24</p> <p>24 months [1] 146/12</p> <p>26 [10] 87/21 108/5 108/11 108/22 109/19 111/3 111/11 111/13 124/3 128/11</p> <p>26's [1] 110/20</p> <p>27-page [1] 97/20</p> <p>28773 [1] 109/5</p> <p>2nd [1] 156/4</p> <p>3</p> <p>30 minutes [2] 6/4 141/14</p> <p>30,000 [2] 123/7 132/2</p> <p>30303 [1] 1/25</p> <p>30th [2] 25/7 25/10</p> <p>31st [1] 50/1</p> <p>348 [7] 142/6 145/3 180/3 180/15 182/19 186/4 186/5</p> <p>358 [2] 186/2 186/2</p> <p>3:03 [1] 144/17</p> <p>4</p> <p>40 percent [1] 52/12</p> <p>4000 [1] 132/7</p> <p>403 [1] 189/15</p> <p>403 objection [1] 191/15</p> <p>404 [1] 1/25</p> <p>46 [2] 155/8 155/9</p>
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4	126/17 126/19 127/23 128/2 128/12 128/12 128/15 128/16 128/18 128/19 129/9 129/19 129/23 129/24 130/22 131/23 132/15 134/11 134/17 135/22 139/14 139/15 140/12 141/3 141/14 141/17 142/8 142/12 143/12 143/14 143/20 150/12 154/16 154/18 154/19 159/5 163/23 164/20 164/21 164/22 165/1 167/23 168/4 168/13 168/18 168/22 169/7 169/8 170/3 170/22 171/10 171/22 172/17 177/20 179/1 180/2 180/6 180/7 180/10 181/17 183/3 183/9 184/10 186/24 188/11 188/20 189/4 189/5 189/6 190/7 190/12 193/24 195/7 196/21 197/24 198/5 199/16 200/19 205/10	65/11 81/19 95/14 96/21 97/23 97/25 98/3 110/5 122/8 128/8 154/9 actually [25] 30/1 32/7 34/17 57/19 62/8 63/4 63/10 70/15 70/17 86/19 89/11 104/12 115/2 131/3 148/11 154/1 156/16 156/17 161/13 162/9 167/4 167/10 167/15 181/1 192/11 acutely [1] 191/15 ADAM [1] 2/9 adapted [1] 40/15 add [3] 95/24 173/12 205/22 adding [1] 130/19 addition [3] 11/24 26/7 185/1 additional [10] 9/11 11/4 36/10 54/17 60/21 88/14 119/23 126/23 191/18 200/10 address [20] 6/24 9/16 9/18 9/23 15/6 15/8 24/1 24/24 26/20 26/24 37/11 68/2 68/4 71/20 80/3 80/5 80/18 136/15 193/2 207/8 addressed [2] 22/18 101/10 addresses [1] 202/17 addressing [3] 13/7 13/18 14/9 adequacy [1] 24/9 adequate [3] 8/11 8/15 52/20 adequately [3] 8/9 8/10 200/18 adjourned [2] 7/16 207/13 adjust [1] 110/25 administration [2] 56/10 177/8 administrative [2] 5/18 107/24 admissible [1] 204/17 admission [1] 51/9 admit [2] 91/4 148/19 admitted [1] 51/19 admonished [1] 96/17 advance [1] 38/9 advantage [6] 55/23 56/2 56/6 57/15 63/4 63/5 advantages [3] 55/13 55/21 56/14 advice [1] 21/24 Advil [1] 197/13 advised [1] 194/9 advisory [9] 19/17 25/7 30/15 114/11 114/16 192/25 193/22 193/25 194/5 advocate [1] 96/14 afar [1] 140/20 affect [13] 50/7 50/16 59/11 59/15 59/18 60/10 74/22 77/14 77/17 77/20 122/8 189/23 190/8 affected [6] 21/9 50/19 70/14 99/19 123/5 197/22 affects [1] 47/13 affidavits [1] 161/25 affirmative [4] 44/17 55/1 55/4 162/17 affirmatively [1] 155/10 affirmed [1] 206/1 afford [1] 72/21 afoul [1] 109/18 after [43] 1/6 7/8 7/15 10/7 15/19 21/10 24/8 44/13 44/25 45/6 49/10 49/10 50/1 50/4 50/8 51/22 54/18 63/8 63/20 85/25 86/13 101/18 103/10 103/12 109/8 119/11 123/11 124/10 131/14 143/21 152/17 153/9 155/8 156/21 160/16 160/18 161/1 164/17 165/8 165/12 176/12 201/19 202/20 aftermath [1] 135/8 afternoon [6] 152/20 176/15 176/18
4:47 [1] 207/14 4th [1] 157/25		
5		
5.17 [2] 11/18 12/2 5.5 [1] 138/15 5.5-A [1] 138/16 500 hours [1] 54/15 5:00 in [1] 207/10 5:00 to [1] 152/1		
6		
60 days [1] 143/21		
7		
737 [3] 100/5 100/9 100/12 75 [1] 1/24		
8		
8.4 [1] 109/11 8.5 [1] 109/11 80 [5] 57/18 126/8 126/13 126/14 126/20 803 [1] 203/13 86 percent [5] 56/23 56/25 57/8 57/18 124/20 89 [2] 19/17 115/3 8A [1] 1/10	above [1] 126/20 absent [1] 52/11 absentee [20] 28/14 46/15 101/21 153/18 153/21 153/23 153/25 157/15 162/21 162/24 163/2 163/5 163/8 163/18 163/22 164/14 164/23 166/24 167/3 174/6 absolutely [3] 64/19 138/2 195/17 Academies [2] 135/25 136/4 Academy [1] 135/12 accept [1] 203/9 acceptable [1] 6/4 accepted [2] 41/19 55/6 accepting [1] 81/9 access [46] 11/6 15/13 16/21 17/12 17/15 17/16 20/1 20/2 25/5 25/10 25/13 27/11 35/19 43/1 44/21 45/7 45/18 53/24 53/24 54/2 54/8 59/14 59/17 59/23 60/1 60/21 60/21 60/23 62/4 62/5 67/2 67/10 67/14 73/11 73/21 74/2 74/21 104/13 104/14 112/1 112/11 116/11 119/20 119/22 120/19 139/13 accessed [3] 17/8 54/3 54/5 accessibility [1] 30/22 accessible [3] 22/8 116/20 116/21 accessing [1] 81/23 accompanied [1] 195/11 accomplish [3] 64/23 65/12 65/19 accomplished [2] 35/10 35/11 accomplishing [1] 192/1 According [1] 184/14 account [1] 53/2 accuracy [11] 13/24 14/3 14/6 14/8 14/10 14/13 46/23 117/24 189/23 189/24 190/8 accurate [5] 8/5 15/4 34/25 68/8 191/15 AccuVote [2] 42/1 60/16 achieve [4] 55/1 55/6 57/7 77/7 achieved [3] 48/11 57/8 124/20 achievers [1] 30/7 achieving [4] 32/6 32/6 54/20 54/23 acquire [1] 136/12 across [7] 33/24 60/10 84/8 89/16 89/24 135/16 135/16 acted [2] 84/16 96/14 action [1] 20/24 active [2] 161/24 186/10 activities [1] 118/11 actor [4] 17/13 81/25 98/9 183/19 actors [4] 17/16 17/17 135/6 137/6 actual [15] 14/24 14/25 40/18 64/23	
9		
90 [1] 1/4 90 percent [3] 91/11 93/3 93/17 9:30 [1] 200/23		
A		
AARON [2] 2/7 199/11 abbreviated [1] 127/12 abilities [1] 55/22 ability [9] 9/23 9/24 11/25 20/3 30/25 41/9 77/13 128/12 195/20 able [32] 5/20 19/21 45/18 53/24 53/24 59/18 68/11 72/23 73/1 73/3 74/7 74/7 78/16 86/16 86/23 102/18 119/21 120/2 121/3 132/13 147/10 147/12 147/14 154/2 155/11 155/19 156/3 163/15 163/16 167/3 187/16 206/10 about [206] 6/4 7/20 10/5 10/15 10/19 10/19 11/3 11/9 11/11 12/9 12/16 13/2 14/14 14/18 14/22 15/9 17/11 20/5 23/24 23/24 23/25 24/4 24/9 25/15 26/4 31/20 32/25 33/3 33/6 34/1 36/5 38/7 38/16 38/25 40/8 40/21 40/22 41/5 41/5 41/13 43/1 44/24 45/4 46/19 46/24 47/23 54/20 55/1 55/1 55/9 58/10 58/13 59/11 60/19 61/16 61/20 61/22 62/9 62/24 63/7 63/20 63/21 63/22 65/19 68/3 71/17 72/4 73/19 76/1 76/23 78/15 78/17 79/4 79/12 79/13 80/9 81/5 81/7 83/8 84/7 84/13 86/16 88/23 89/10 89/15 89/18 92/6 92/11 93/1 93/17 95/7 97/18 98/5 99/24 100/21 101/9 102/20 103/14 103/23 104/11 104/13 105/2 106/13 112/7 112/11 112/17 112/22 114/11 114/14 114/16 114/22 115/3 115/10 116/7 116/8 116/13 116/22 117/7 119/1 120/11 122/4 124/14 125/14 125/15 125/15 125/21 125/22		

<p>A</p> <p>afternoon... [3] 195/2 195/3 201/23</p> <p>afterthought [1] 42/19</p> <p>Afterwards [1] 87/6</p> <p>again [41] 16/4 16/8 17/7 19/4 27/6 28/17 37/15 41/3 42/14 47/7 47/18 56/16 58/7 69/1 74/10 74/24 75/10 90/8 90/11 91/24 97/4 98/18 102/22 114/10 120/10 122/4 123/16 124/14 125/11 128/10 142/7 147/6 157/6 168/11 169/14 172/6 173/24 181/15 185/2 186/23 194/10</p> <p>against [15] 5/10 8/9 16/18 20/10 25/13 33/2 40/24 63/13 63/18 64/6 70/11 95/1 95/9 95/13 155/12</p> <p>ago [2] 26/16 121/14</p> <p>agree [55] 7/24 8/2 8/24 10/1 11/17 14/2 14/5 15/13 15/22 16/1 16/5 20/5 20/7 27/19 28/10 28/11 28/23 30/16 43/10 45/15 46/4 46/14 47/5 53/5 55/17 61/2 61/4 61/5 61/14 62/11 67/9 73/9 73/16 74/21 75/18 76/12 76/17 76/20 77/6 77/9 77/13 80/21 81/25 83/2 87/25 98/9 100/18 101/16 102/1 102/15 127/16 127/17 132/17 133/9 192/16</p> <p>agreed [3] 54/14 103/21 194/12</p> <p>agreement [7] 83/5 191/9 192/7 192/7 192/9 192/12 194/16</p> <p>agrees [2] 109/8 109/15</p> <p>ahead [15] 23/20 40/2 40/6 53/21 82/18 83/7 113/24 133/21 147/21 179/6 184/16 193/10 193/18 197/7 201/9</p> <p>aid [1] 110/18</p> <p>AIDED [1] 1/21</p> <p>aimed [2] 75/6 75/6</p> <p>aircraft [2] 9/15 100/5</p> <p>AL [2] 1/4 1/6</p> <p>alarms [1] 69/13</p> <p>alcove [2] 156/15 168/23</p> <p>alert [1] 176/2</p> <p>ALEX [2] 4/4 7/7</p> <p>all [134] 5/4 5/15 6/10 21/7 21/9 26/20 27/4 27/17 28/23 37/10 37/14 37/18 37/21 37/22 40/2 45/10 49/1 49/3 49/6 51/13 52/13 53/16 55/21 60/12 68/19 69/8 70/20 70/24 72/15 73/1 75/3 76/24 78/25 79/2 79/11 79/14 80/14 82/10 83/3 83/4 83/6 83/9 83/12 83/13 86/19 86/22 87/8 89/16 93/9 93/11 94/5 98/15 98/21 101/13 104/3 105/18 107/20 107/22 107/25 108/1 109/3 111/7 113/6 113/10 113/20 120/2 120/21 123/6 123/15 126/1 129/10 130/14 132/2 132/5 132/7 132/11 134/13 136/18 139/17 139/24 140/19 140/19 141/14 144/19 145/12 146/7 146/21 147/24 148/8 148/9 148/24 150/24 151/9 151/21 154/3 154/24 156/14 159/13 161/22 162/2 172/22 173/23 175/10 175/13 176/25 179/3 180/11 181/20 186/12 188/1 188/18 190/23 191/3 191/16 194/23 195/23 196/17 197/1 197/8 198/7 199/20 200/11 200/14 201/9 201/12 202/10 206/3 206/8 206/11 206/20 207/6 207/7 207/9 207/12</p> <p>allegation [1] 186/24</p>	<p>allegations [3] 78/23 95/8 190/12</p> <p>allege [1] 181/21</p> <p>alleged [10] 94/25 177/24 178/12 179/18 181/13 183/25 184/15 186/21 189/23 190/7</p> <p>allegedly [1] 184/11</p> <p>alleges [1] 186/5</p> <p>allow [9] 73/13 113/20 120/15 128/17 132/12 147/2 147/19 191/19 192/2</p> <p>allowed [10] 57/22 58/4 58/7 61/24 71/16 89/8 101/8 151/5 151/6 206/6</p> <p>allowing [2] 25/9 79/1</p> <p>allows [1] 71/5</p> <p>ALLOY [1] 3/5</p> <p>almost [4] 38/21 119/21 120/15 132/10</p> <p>along [1] 69/20</p> <p>already [14] 9/14 20/8 42/21 43/4 44/2 59/20 68/17 83/7 97/4 114/17 128/16 150/12 197/11 205/10</p> <p>also [72] 5/12 8/2 9/7 15/5 20/7 25/11 28/13 28/15 30/8 31/18 33/15 35/7 39/8 41/15 41/25 42/7 42/11 45/4 46/1 48/24 50/11 52/22 54/8 56/10 58/10 63/23 67/21 69/25 70/14 72/1 73/9 74/22 75/15 80/18 87/20 88/4 96/3 102/2 102/16 103/17 108/4 109/15 110/22 111/12 112/17 120/10 122/12 123/12 137/20 144/12 149/16 149/20 152/13 152/24 158/1 159/3 162/21 165/6 168/15 168/21 170/21 170/22 177/5 177/11 177/13 180/6 183/17 185/23 185/23 200/3 203/13 206/9</p> <p>alter [7] 39/13 42/8 48/2 59/2 64/9 75/7 77/21</p> <p>alteration [3] 64/23 65/12 65/16</p> <p>altered [4] 26/20 49/16 50/7 123/8</p> <p>altering [3] 34/4 34/8 47/1</p> <p>alternatives [1] 120/1</p> <p>alters [1] 47/17</p> <p>although [11] 17/10 25/11 50/18 52/19 56/12 60/18 62/15 64/25 72/12 88/16 92/3</p> <p>altogether [2] 94/2 187/12</p> <p>always [6] 14/4 48/1 124/10 160/12 164/25 165/20</p> <p>am [14] 15/12 16/23 23/24 24/4 24/9 53/20 107/13 134/11 162/23 172/3 180/19 186/1 186/1 196/11</p> <p>amended [1] 205/5</p> <p>AMERICA [1] 208/3</p> <p>among [4] 5/22 15/17 57/19 57/25</p> <p>amount [7] 52/19 65/2 80/20 119/20 136/4 136/22 156/19</p> <p>amusement [1] 156/13</p> <p>AMY [1] 1/11</p> <p>analogy [1] 100/12</p> <p>analysis [13] 15/10 20/14 20/17 26/10 33/21 53/23 54/20 75/16 80/20 204/2 204/24 205/10 205/11</p> <p>analyze [1] 33/13</p> <p>analyzed [5] 33/6 33/8 33/10 33/15 53/25</p> <p>ANDREU [2] 2/10 4/7</p> <p>ANDREU-VON [2] 2/10 4/7</p> <p>Angeles [4] 93/1 93/4 93/15 94/7</p> <p>anomalies [1] 62/16</p> <p>anomaly [1] 93/22</p> <p>another [16] 5/8 25/18 30/22 31/12</p>	<p>31/14 45/8 56/6 57/5 74/2 82/13 91/25 136/21 137/8 152/2 175/22 183/10</p> <p>answer [19] 23/17 39/17 80/9 83/4 88/22 89/1 89/6 128/23 132/25 133/14 133/21 146/16 157/3 159/10 171/2 176/19 186/9 187/14 187/16</p> <p>answered [2] 133/17 133/19</p> <p>answering [1] 113/6</p> <p>answers [2] 83/3 144/8</p> <p>anteroom [1] 156/10</p> <p>anticipate [1] 175/15</p> <p>Antrim [11] 7/20 10/5 10/9 10/12 10/25 45/24 88/9 112/14 112/16 137/21 138/4</p> <p>anxiety [2] 156/20 196/6</p> <p>any [107] 1/8 8/16 11/3 11/5 17/12 17/13 20/14 20/18 22/2 22/7 22/23 22/24 25/9 30/18 41/16 47/15 47/25 49/8 52/24 53/9 55/3 59/12 62/4 65/1 65/3 65/3 66/17 71/10 74/7 75/23 80/24 83/19 85/12 85/13 85/14 85/17 85/18 86/4 87/5 95/12 95/13 96/20 97/22 102/6 102/25 104/17 104/18 106/21 107/5 107/8 108/14 113/15 114/5 115/19 115/23 116/25 117/2 117/13 117/21 118/3 118/18 120/21 121/9 129/15 129/16 133/13 133/23 137/12 137/24 139/1 147/16 155/24 160/1 161/4 161/4 161/5 161/7 161/8 161/8 161/11 161/12 161/12 161/20 161/21 162/7 162/7 162/8 162/8 163/7 167/14 171/15 171/17 171/18 172/16 172/18 172/23 179/22 188/11 188/21 188/21 188/24 191/6 193/12 193/21 194/4 194/7 194/20</p> <p>anybody [2] 149/11 173/16</p> <p>anyone [7] 10/18 60/23 61/19 69/24 81/13 107/5 155/23</p> <p>anything [11] 6/24 13/2 17/15 38/24 105/6 114/22 116/7 139/17 189/5 189/16 207/8</p> <p>anyway [2] 187/22 188/16</p> <p>anywhere [1] 104/25</p> <p>APK [2] 67/15 67/18</p> <p>apologize [6] 37/21 90/15 125/17 126/3 169/25 182/2</p> <p>apparent [1] 24/1</p> <p>apparently [7] 5/11 70/22 70/23 145/21 146/4 181/23 183/10</p> <p>appeal [2] 104/21 206/1</p> <p>appealed [1] 206/1</p> <p>appear [3] 110/6 184/11 186/9</p> <p>appearance [1] 192/10</p> <p>appearing [1] 175/9</p> <p>appears [1] 179/18</p> <p>apples [1] 102/4</p> <p>application [2] 67/10 117/1</p> <p>applications [2] 24/16 163/19</p> <p>applied [2] 24/15 117/6</p> <p>applies [1] 134/6</p> <p>apply [8] 17/10 24/22 26/25 57/16 80/25 81/10 107/11 107/17</p> <p>applying [2] 57/3 100/10</p> <p>appointed [1] 195/4</p> <p>appreciate [1] 151/6</p> <p>appreciates [1] 110/22</p> <p>approach [6] 51/1 68/5 90/24 96/25 182/6 202/4</p> <p>appropriate [10] 6/3 6/18 17/9 23/18</p>
--	--	--

<p>A</p> <p>appropriate... [6] 37/9 38/11 83/24 104/9 111/25 184/21</p> <p>approval [1] 88/13</p> <p>approve [1] 88/18</p> <p>approved [1] 206/18</p> <p>approximately [4] 18/20 26/5 91/11 121/20</p> <p>arbitrary [3] 60/24 64/6 65/4</p> <p>architecture [2] 13/21 119/15</p> <p>are [281]</p> <p>area [1] 128/13</p> <p>areas [1] 46/17</p> <p>aren't [1] 47/23</p> <p>argue [1] 108/23</p> <p>arguing [1] 108/20</p> <p>arising [1] 194/5</p> <p>Arizona [2] 45/16 45/22</p> <p>Arkansas [2] 91/22 91/24</p> <p>Arnold [1] 49/18</p> <p>arose [1] 112/8</p> <p>around [5] 38/10 79/22 111/21 138/7 149/9</p> <p>arranged [1] 205/4</p> <p>article [3] 50/22 51/6 51/21</p> <p>articulated [1] 191/17</p> <p>as [195] 6/5 6/8 7/8 8/6 9/8 10/25 12/4 12/10 12/20 12/20 12/20 15/1 15/1 15/3 16/13 22/14 24/5 25/1 25/11 25/13 25/15 26/10 27/22 32/9 32/15 32/17 33/23 35/2 36/7 37/13 38/6 41/16 42/18 43/9 47/12 47/18 48/4 48/10 50/3 51/5 52/1 52/1 52/6 52/19 55/23 56/14 59/25 60/3 62/5 63/6 63/9 63/12 64/5 65/14 66/4 66/18 69/11 70/17 70/19 72/12 78/2 82/6 85/4 87/17 89/18 89/25 90/7 90/10 91/8 91/9 91/13 91/19 92/1 92/20 93/5 93/24 94/1 94/15 97/9 99/6 99/18 100/22 104/22 105/10 105/13 106/23 108/5 108/11 108/13 108/19 108/22 109/13 109/21 111/18 114/13 115/20 118/13 120/7 122/18 124/2 130/18 131/7 131/9 131/10 132/6 133/12 133/23 135/7 135/19 135/20 136/3 136/3 136/10 136/12 136/23 137/5 137/5 139/14 141/4 141/5 142/12 143/10 143/12 143/20 143/20 144/15 144/15 144/18 149/16 152/13 152/17 153/10 155/15 158/8 159/19 159/22 160/13 163/4 165/20 165/20 165/22 165/22 166/21 167/4 167/6 167/15 167/18 167/21 170/10 170/24 170/25 173/9 176/12 176/25 177/2 177/13 178/20 178/20 180/23 180/24 181/15 182/9 182/18 182/25 184/11 185/3 186/19 186/19 186/21 186/23 187/18 189/15 190/12 190/12 190/14 192/1 192/13 192/14 193/2 193/2 194/7 194/13 194/14 194/17 197/23 197/23 199/1 201/19 202/2 202/8 203/3 204/20 205/3 205/3 205/22</p> <p>ask [40] 22/19 36/25 43/20 54/16 68/1 78/15 78/16 78/17 78/22 79/4 79/11 79/12 81/5 81/7 83/19 86/3 97/18 102/20 105/3 111/8 115/10 117/7 125/14 127/4 128/19 129/13 141/16 142/8 142/10 143/12 145/11 147/12</p>	<p>158/11 176/25 179/25 180/13 188/20 191/21 194/10 205/1</p> <p>asked [45] 5/9 12/10 17/23 37/6 40/8 43/18 57/9 60/17 79/16 89/7 104/6 112/6 112/11 112/17 113/4 114/11 114/16 119/1 120/10 122/4 124/14 124/18 125/15 125/15 125/21 126/16 127/23 128/18 129/9 129/22 129/24 130/22 131/12 133/17 146/14 165/6 171/1 171/10 172/20 178/12 184/20 191/24 193/6 195/7 205/5</p> <p>asking [22] 22/13 61/22 83/22 86/22 104/7 104/11 104/16 113/3 125/11 128/11 128/15 128/16 139/5 144/8 158/11 161/22 162/3 173/10 179/1 180/6 180/7 203/8</p> <p>asserted [1] 172/18</p> <p>assess [1] 112/7</p> <p>assessed [1] 106/20</p> <p>assessing [1] 107/13</p> <p>assessment [7] 83/24 100/22 104/9 107/8 107/15 112/2 131/21</p> <p>assign [1] 184/16</p> <p>assigned [4] 177/23 179/13 179/19 189/9</p> <p>assistance [2] 10/2 202/23</p> <p>assistive [1] 173/14</p> <p>associated [3] 18/5 120/11 183/14</p> <p>assume [3] 62/4 111/25 122/5</p> <p>assumes [1] 122/7</p> <p>assuming [4] 68/8 70/13 74/25 79/21</p> <p>ATLANTA [5] 1/2 1/25 5/2 208/8 208/10</p> <p>atom [1] 58/22</p> <p>attached [5] 1/4 14/12 14/18 34/14 185/18</p> <p>attaching [1] 1/7</p> <p>attack [65] 9/24 28/21 34/19 34/22 47/6 47/7 47/9 47/10 47/12 47/14 47/16 47/20 47/20 47/21 47/24 49/16 49/20 50/9 59/1 59/2 59/4 59/16 59/18 59/21 59/22 59/24 60/2 60/5 60/7 61/6 61/7 62/1 62/22 63/3 63/9 72/2 72/9 75/4 75/6 75/11 75/19 76/13 76/18 76/19 77/1 77/7 77/7 77/11 77/13 82/5 95/2 95/9 95/12 95/21 106/8 106/9 106/23 106/24 110/3 110/12 110/16 120/25 131/3 133/12 135/5</p> <p>attacked [1] 122/17</p> <p>attacker [14] 16/3 16/7 16/14 42/7 61/7 65/6 67/9 67/12 74/21 77/9 77/21 112/23 119/19 122/19</p> <p>attacker's [1] 122/11</p> <p>attackers [11] 17/8 42/21 43/4 43/6 107/16 120/1 120/14 120/19 122/11 122/12 136/24</p> <p>attacking [2] 58/24 87/18</p> <p>attacks [29] 14/9 24/19 26/23 46/24 48/1 61/23 63/19 63/21 71/21 75/13 76/2 76/5 76/8 76/15 76/22 76/25 99/19 100/14 104/17 104/19 106/1 106/14 106/21 107/14 115/1 118/12 121/4 130/23 137/1</p> <p>attempted [2] 67/2 84/18</p> <p>attempts [1] 13/14</p> <p>attendance [1] 138/20</p> <p>attention [3] 42/12 119/3 151/25</p> <p>audit [32] 15/1 15/3 15/3 15/5 24/22</p>	<p>26/17 26/19 28/12 45/19 47/5 47/8 47/9 47/10 47/11 47/12 47/16 47/18 47/20 47/23 48/1 49/2 49/7 49/10 75/8 75/11 75/16 77/10 103/1 103/7 132/10 143/11 202/21</p> <p>auditable [1] 27/22</p> <p>audited [3] 49/12 74/25 190/3</p> <p>auditing [1] 26/25</p> <p>AuditMark [1] 28/7</p> <p>audits [14] 14/23 24/24 26/13 26/22 48/5 48/7 48/10 48/14 49/13 74/6 75/12 118/8 118/21 146/13</p> <p>August [2] 10/16 16/22</p> <p>August 2023 [1] 16/22</p> <p>authenticate [2] 184/8 203/11</p> <p>authenticated [1] 184/4</p> <p>authentication [4] 69/18 69/23 70/1 185/2</p> <p>author [3] 55/24 188/15 204/20</p> <p>authority [2] 178/19 178/21</p> <p>authors [2] 51/15 51/18</p> <p>available [19] 6/2 19/8 23/1 27/20 28/8 29/23 30/2 40/13 41/23 43/4 43/19 45/21 92/13 137/17 138/1 173/12 196/24 196/25 207/2</p> <p>Avenue [1] 156/7</p> <p>avoid [3] 15/24 40/19 110/1</p> <p>aware [38] 10/23 13/24 16/20 21/12 21/19 22/4 22/10 22/14 23/12 25/9 25/12 41/22 44/1 47/25 54/4 72/19 78/2 79/8 79/16 80/12 83/23 85/8 85/9 86/20 104/8 118/4 131/18 135/4 150/5 163/18 172/3 172/9 172/14 188/21 190/13 193/12 193/21 194/4</p> <p>awareness [3] 78/23 80/9 134/25</p> <p>away [3] 38/1 114/7 166/10</p> <p>B</p> <p>baby [1] 196/13</p> <p>back [34] 5/6 7/1 8/23 10/5 55/8 94/14 104/5 104/7 123/16 123/16 127/4 127/20 128/11 132/10 144/9 144/15 147/4 148/15 148/22 149/7 149/9 164/2 165/10 166/16 168/2 178/2 178/5 185/22 185/24 188/6 196/15 199/21 200/19 204/25</p> <p>background [5] 24/16 77/3 116/25 117/4 121/9</p> <p>Backing [1] 153/4</p> <p>bad [3] 81/25 98/9 166/8</p> <p>badly [1] 69/12</p> <p>balance [3] 62/19 149/15 191/25</p> <p>balancing [1] 62/18</p> <p>ballot [146] 26/21 27/3 27/16 28/14 28/14 28/19 28/21 29/18 29/25 30/5 30/6 34/5 34/7 34/8 37/17 40/13 40/16 40/17 40/18 41/22 42/4 46/6 46/11 49/3 49/25 49/25 50/7 50/8 50/8 50/11 50/18 52/12 52/16 57/23 57/25 58/4 58/16 59/12 61/10 61/20 61/25 63/2 63/18 63/18 63/19 63/21 64/11 64/24 65/2 65/12 65/16 66/6 66/17 68/9 68/20 70/11 71/5 71/5 71/16 74/4 74/6 75/5 75/15 80/18 80/22 81/8 81/12 81/12 81/13 81/14 81/15 81/18 81/19 81/21 81/23 92/13 93/19 101/16 101/20 101/21 102/1 102/8 109/17 112/20 112/25 113/7 113/14 113/16 113/22</p>
--	---	---

<p>B</p> <p>ballot... [57] 114/2 118/9 118/10 118/15 118/24 118/24 122/2 122/3 123/14 125/5 128/7 132/18 132/20 132/23 133/6 133/16 142/21 142/24 153/24 153/25 154/2 154/5 154/8 154/22 155/6 155/11 155/20 155/23 155/25 156/3 156/22 157/12 162/21 162/24 163/2 163/5 163/8 163/12 163/15 163/22 164/14 164/23 164/24 165/2 165/4 165/13 166/1 166/19 166/21 167/3 167/6 167/10 167/13 167/15 167/19 168/2 168/3</p> <p>ballot-marking [12] 27/3 27/16 41/22 42/4 46/6 50/8 58/16 61/10 61/25 92/13 93/19 113/16</p> <p>ballots [91] 27/21 28/25 29/7 29/11 30/9 46/6 46/15 46/16 49/21 50/18 50/22 51/7 52/17 52/20 53/2 53/3 53/6 55/14 56/15 56/19 58/11 59/2 61/9 61/12 61/17 61/21 61/25 62/12 62/14 62/16 62/25 63/1 63/11 63/15 63/24 64/6 68/25 69/6 69/13 71/18 74/14 74/23 74/25 77/14 77/18 77/21 81/9 81/14 82/2 92/9 93/4 98/21 99/6 102/5 102/7 102/24 103/10 103/12 103/12 103/18 103/21 118/9 123/14 123/15 123/17 123/23 125/2 125/10 126/23 126/25 127/24 129/4 132/15 132/21 133/10 141/23 142/8 142/11 142/15 142/17 146/24 147/3 147/4 153/22 163/18 163/19 166/24 167/18 174/8 174/14</p> <p>bar [1] 173/10</p> <p>barcode [9] 24/19 28/25 47/2 49/16 71/22 95/18 96/1 96/4 118/13</p> <p>barcode-based [1] 28/25</p> <p>barcodes [9] 14/4 47/17 48/4 67/8 69/15 69/18 69/19 92/9 92/14</p> <p>Barnes [4] 24/6 186/8 187/9 187/14</p> <p>Barron [1] 164/1</p> <p>base [1] 168/8</p> <p>based [14] 25/16 25/19 25/20 25/20 28/25 41/8 41/9 41/12 46/16 81/1 100/22 102/6 170/4 171/5</p> <p>Bash [11] 34/13 34/19 64/2 64/21 65/10 65/15 72/4 72/16 108/19 110/10 110/16</p> <p>basically [4] 41/3 114/1 136/18 187/22</p> <p>basis [5] 28/12 100/19 108/5 180/22 181/14</p> <p>bathroom [2] 144/7 144/12</p> <p>be [277]</p> <p>bearing [1] 152/20</p> <p>beat [1] 135/10</p> <p>became [1] 10/23</p> <p>because [84] 6/9 9/19 9/21 13/21 15/17 19/14 22/15 26/23 33/1 37/11 37/24 38/24 39/19 40/19 43/8 45/4 48/5 48/24 49/21 50/10 58/19 59/12 60/1 62/20 68/17 69/17 69/24 71/22 77/23 81/11 82/13 82/20 83/9 84/21 86/20 88/2 90/5 92/4 97/12 101/18 102/7 108/15 110/15 110/19 123/10 130/15 133/5 133/7 133/7 138/18 147/13 149/1 149/6 149/19 150/7 150/11 154/13 154/13 156/20 161/17 166/3 166/13</p>	<p>168/5 169/10 172/12 172/17 174/3 174/5 176/1 185/17 187/14 187/22 188/2 188/5 188/10 189/15 190/25 191/9 192/6 194/16 197/1 201/12 204/19 206/17</p> <p>become [1] 153/2</p> <p>BEDARD [1] 3/5</p> <p>been [92] 5/13 7/8 17/10 18/1 20/18 22/17 23/1 27/7 29/19 37/16 43/10 43/13 43/19 44/2 45/7 51/24 53/11 53/15 54/3 61/20 68/17 68/18 70/14 80/3 86/14 95/13 99/3 99/13 101/18 111/21 116/24 117/21 122/17 123/1 123/8 123/12 123/18 123/23 124/2 128/6 132/9 136/7 136/8 136/10 136/11 136/15 136/17 139/7 141/11 141/18 143/3 143/11 143/20 144/8 147/24 148/7 152/17 155/18 155/19 155/21 156/20 160/12 161/5 161/13 161/17 161/24 161/24 162/9 163/24 170/8 176/12 176/23 179/21 179/22 180/14 184/3 186/17 187/4 188/9 188/25 189/3 189/9 190/21 191/1 194/8 195/7 198/18 198/19 201/19 205/6 206/9 206/18</p> <p>before [53] 1/11 5/6 5/19 7/14 13/25 20/3 21/10 42/25 43/5 44/5 50/1 52/24 79/3 85/20 85/20 86/5 86/5 92/25 101/11 101/22 104/4 110/23 111/17 111/22 119/13 127/6 130/3 134/20 135/13 141/5 146/14 147/25 154/5 155/22 159/9 164/14 164/15 164/24 172/21 183/9 187/4 187/20 187/24 188/16 188/22 188/25 189/3 189/7 192/10 195/10 195/14 197/25 208/10</p> <p>begin [2] 23/4 47/1</p> <p>beginning [7] 19/24 34/2 83/17 107/9 120/4 167/25 200/23</p> <p>begins [1] 52/8</p> <p>behalf [2] 2/22 193/22</p> <p>behind [3] 19/18 146/1 157/23</p> <p>being [32] 29/13 43/11 62/19 63/15 63/24 70/2 74/16 102/16 133/4 142/11 143/9 145/10 146/11 146/11 146/12 146/13 151/6 154/2 158/5 181/13 183/25 184/15 184/19 184/20 186/20 190/7 191/10 198/13 198/22 203/17 205/8 205/13</p> <p>belief [10] 27/2 27/15 28/13 30/8 30/10 55/3 72/23 99/1 99/9 100/25</p> <p>believe [53] 10/7 11/13 11/22 16/2 16/6 16/13 18/7 18/17 18/18 19/12 20/17 26/16 29/5 30/12 31/24 32/17 40/8 41/15 45/22 48/7 50/22 51/24 60/6 64/8 73/3 74/16 76/16 92/5 94/2 94/13 100/8 100/10 101/6 104/17 104/19 112/25 114/11 119/4 124/8 130/7 130/11 133/19 135/23 136/14 139/15 140/7 140/8 151/24 169/5 180/14 182/25 185/8 198/18</p> <p>believed [1] 42/21</p> <p>BELINFANTE [3] 3/4 3/5 5/8</p> <p>bell [1] 38/20</p> <p>BEN [1] 2/6</p> <p>bench [9] 1/10 6/19 37/13 40/5 97/2 141/4 144/10 144/18 151/11</p> <p>bend [1] 111/22</p> <p>Benedict [1] 49/18</p> <p>benefit [1] 136/24</p>	<p>Bernhard [1] 50/23</p> <p>besides [1] 48/13</p> <p>best [3] 30/9 164/4 174/12</p> <p>bet [2] 16/19 22/15</p> <p>better [8] 15/25 16/4 28/14 48/12 65/22 145/11 154/1 197/5</p> <p>between [14] 16/11 34/23 34/24 35/2 36/17 42/17 58/16 62/16 114/4 115/20 133/4 138/16 160/25 167/24</p> <p>beyond [7] 31/22 101/5 101/9 106/13 124/2 128/13 185/2</p> <p>bias [4] 101/6 101/9 101/9 108/3</p> <p>Biden [3] 36/17 37/17 38/3</p> <p>big [2] 133/4 166/17</p> <p>billion [1] 136/14</p> <p>binder [1] 114/12</p> <p>birth [2] 152/13 159/2</p> <p>bit [20] 11/11 14/22 27/14 33/6 46/24 70/21 72/4 93/18 112/5 144/20 145/11 146/3 147/19 150/17 153/4 168/18 169/18 169/21 179/15 185/11</p> <p>black [1] 72/15</p> <p>block [1] 72/13</p> <p>blocked [2] 105/10 105/12</p> <p>blocking [1] 114/3</p> <p>blue [1] 203/19</p> <p>BMD [81] 12/12 12/15 14/4 16/11 27/20 27/23 28/8 28/13 32/7 32/15 32/18 33/8 34/3 34/18 34/23 34/24 35/2 36/5 50/16 50/20 52/5 52/6 52/20 53/25 60/11 60/16 60/21 60/23 62/25 63/1 63/24 66/12 67/10 67/14 69/3 71/19 72/7 72/11 81/1 81/14 81/15 90/5 91/13 91/25 92/11 94/1 94/9 98/17 103/23 108/18 109/10 109/23 109/24 110/13 116/21 120/13 121/24 123/1 123/3 123/12 131/3 131/25 142/21 145/6 153/19 153/20 154/4 154/5 154/8 155/12 161/18 163/15 165/6 165/9 167/9 170/8 174/5 174/8 174/24 175/1 179/23</p> <p>BMD-based [1] 81/1</p> <p>BMDs [66] 15/1 27/25 28/2 32/5 40/22 40/23 42/1 55/13 55/19 55/21 55/23 56/2 56/14 56/19 89/16 89/18 89/25 90/4 90/9 90/18 91/9 91/19 91/21 91/22 92/1 92/7 92/8 115/5 116/19 117/3 117/5 119/2 122/9 122/21 122/22 123/5 123/15 125/7 126/24 127/11 131/14 132/2 132/14 146/20 153/21 156/14 156/17 158/12 162/16 164/9 164/15 164/17 165/1 165/2 165/4 165/14 168/22 169/2 169/16 169/19 169/24 172/3 172/5 173/11 173/12 173/18</p> <p>board [39] 92/5 141/7 141/19 143/4 143/15 146/20 176/21 176/23 177/1 177/19 177/22 177/23 178/5 178/7 178/9 178/13 178/16 178/20 178/21 179/7 179/21 180/14 184/15 186/7 186/14 187/4 187/20 187/24 188/16 188/22 189/1 189/3 189/4 189/7 195/5 195/10 202/14 202/22 203/3</p> <p>board's [1] 178/1</p> <p>body [1] 114/4</p> <p>booted [1] 73/5</p> <p>booth [2] 57/13 113/17</p> <p>borne [1] 100/13</p> <p>both [20] 46/7 50/12 60/15 72/24 75/17</p>
---	--	--

<p>B</p> <p>both... [15] 96/4 103/19 113/1 114/1 137/4 138/19 141/12 149/25 150/3 158/3 158/10 165/15 191/14 196/24 196/25</p> <p>bottom [1] 52/7</p> <p>box [7] 50/18 63/18 63/19 63/21 123/14 164/24 166/25</p> <p>boxes [1] 163/9</p> <p>boy [1] 48/15</p> <p>BOYLE [1] 3/9</p> <p>BRAD [1] 1/6</p> <p>breach [8] 24/8 25/14 43/5 43/7 43/9 43/19 44/4 44/25</p> <p>breaches [5] 114/21 114/24 116/5 120/11 120/12</p> <p>break [14] 6/20 38/14 53/13 53/14 53/20 83/7 83/14 104/7 144/7 144/13 144/15 144/17 196/10 200/18</p> <p>brief [12] 5/6 53/20 102/13 105/20 107/21 144/17 145/2 173/22 175/18 175/24 183/21 194/21</p> <p>briefly [8] 5/19 10/6 55/8 102/11 177/18 178/23 191/7 201/6</p> <p>bright [1] 72/20</p> <p>bring [8] 57/17 57/22 57/25 58/4 129/12 154/12 172/13 173/4</p> <p>bringing [2] 57/5 104/21</p> <p>brittle [4] 13/8 119/16 119/17 119/18</p> <p>brittleness [4] 13/6 13/21 119/24 134/3</p> <p>broader [1] 179/24</p> <p>broken [2] 115/6 116/6</p> <p>brought [5] 94/25 127/22 157/22 202/17 202/17</p> <p>BROWN [4] 2/15 2/15 4/11 4/13</p> <p>Brown's [1] 191/14</p> <p>BRUCE [5] 2/15 2/15 144/23 144/24 145/25</p> <p>BRYAN [2] 3/6 3/7</p> <p>bubbled [1] 46/16</p> <p>bubbled-in [1] 46/16</p> <p>bubbles [2] 28/15 46/22</p> <p>build [5] 59/6 59/13 60/8 64/5 64/18</p> <p>building [2] 70/3 156/9</p> <p>builds [1] 74/14</p> <p>built [3] 35/9 66/14 67/4</p> <p>bulk [1] 93/12</p> <p>bullet [10] 20/21 21/9 21/16 22/6 23/15 23/16 24/3 24/4 24/18 26/14</p> <p>bullets [4] 22/24 23/2 23/12 23/14</p> <p>Bunny [11] 34/13 34/19 64/2 64/21 65/10 65/15 72/4 72/16 108/19 110/10 110/16</p> <p>burden [1] 157/10</p> <p>Bureau [1] 10/21</p> <p>BUSINESS [1] 2/11</p> <p>busy [1] 108/15</p> <p>button [2] 119/10 165/11</p> <p>buttons [2] 155/13 165/8</p> <p>buy [1] 122/18</p>	<p>11/9 118/21 124/10 141/7 152/4 175/8 175/15 194/12</p> <p>called [5] 58/21 62/17 124/24 141/11 158/25</p> <p>calling [2] 112/25 178/24</p> <p>calls [2] 67/6 161/15</p> <p>came [14] 10/13 10/23 44/11 44/16 44/23 44/23 44/25 81/15 104/6 123/15 170/11 193/1 202/25 203/19</p> <p>camera [2] 38/8 108/9</p> <p>cameras [1] 73/17</p> <p>campaign [2] 94/15 94/22</p> <p>CAMPBELL [1] 2/6</p> <p>can [144] 6/8 6/9 6/19 8/5 8/24 9/1 9/6 9/16 12/7 12/8 14/8 15/6 15/8 16/2 16/6 20/10 23/3 27/16 32/24 36/4 38/16 39/21 41/5 43/8 43/18 46/22 50/12 53/13 54/22 54/24 55/22 56/5 56/6 56/10 56/12 56/16 58/21 60/23 64/9 64/13 65/19 65/21 65/22 66/22 66/23 68/6 69/25 72/1 72/3 72/6 76/2 76/13 77/9 78/15 78/17 79/11 79/12 80/5 80/21 83/9 85/2 88/20 91/8 93/24 94/11 97/4 101/14 101/16 101/19 101/21 102/2 105/2 105/13 106/13 107/5 114/13 115/12 119/4 122/6 123/10 124/10 126/8 130/14 132/19 133/13 133/22 133/24 140/18 141/1 147/16 148/9 148/19 150/3 150/24 151/22 151/25 152/2 153/24 155/22 156/2 159/12 162/5 167/5 167/7 167/10 167/19 167/19 169/12 171/4 173/4 173/13 174/12 174/15 174/18 180/1 180/20 181/2 181/18 182/11 182/15 182/18 184/8 186/19 186/22 187/24 188/10 188/13 189/6 190/3 190/7 190/24 193/13 194/14 197/5 198/10 198/13 198/23 200/18 201/8 202/12 203/11 203/24 206/17 206/19</p> <p>can't [34] 8/21 15/14 17/7 18/23 27/20 29/2 32/22 37/23 38/20 47/15 48/16 48/16 62/22 74/10 78/18 82/4 82/6 83/19 99/18 99/21 100/14 100/17 105/2 114/1 123/15 145/25 147/11 149/19 167/14 167/20 186/10 191/20 194/7 198/16</p> <p>candidate [4] 38/17 38/23 94/19 94/20</p> <p>candidates [13] 38/19 38/25 57/6 57/9 57/12 64/3 108/1 109/16 109/19 110/4 110/7 166/4 202/20</p> <p>cannot [7] 14/23 14/25 28/15 72/21 79/12 79/13 186/6</p> <p>capabilities [2] 36/14 143/11</p> <p>capable [1] 77/5</p> <p>capture [2] 63/23 174/25</p> <p>captured [1] 63/15</p> <p>card [29] 34/3 49/24 60/19 61/1 61/3 61/8 61/23 117/12 120/25 121/1 143/1 143/5 146/9 146/15 146/15 146/22 154/5 154/8 154/10 154/22 155/11 156/1 156/22 157/12 165/13 180/7 188/22 188/25 189/4</p> <p>cards [12] 143/9 143/13 143/23 146/18 146/20 155/20 189/7 189/10 189/21 189/25 190/5 190/8</p> <p>care [3] 6/22 149/14 195/20</p> <p>careful [2] 109/8 187/18</p> <p>carefully [2] 49/21 156/1</p>	<p>cares [1] 149/12</p> <p>Carey [1] 183/20</p> <p>Carolina [2] 91/19 91/21</p> <p>carried [1] 76/16</p> <p>carry [2] 76/13 121/3</p> <p>CARY [1] 2/20</p> <p>case [83] 4/3 6/15 6/16 7/5 9/12 20/18 24/14 25/12 25/17 26/10 31/16 31/21 31/23 31/25 32/2 32/10 35/23 36/1 36/12 42/15 42/25 44/10 44/12 50/3 51/23 51/24 54/9 61/20 63/13 64/20 65/1 72/19 77/25 78/14 82/13 94/13 94/25 95/4 95/6 95/7 95/8 95/10 95/20 96/8 96/20 97/15 97/25 98/3 99/23 108/14 109/2 114/5 115/19 117/13 118/5 123/25 124/3 128/14 129/5 133/3 148/18 150/11 150/16 152/22 158/8 162/12 169/7 173/2 173/10 176/17 177/23 179/18 186/2 186/6 186/9 186/10 189/9 196/6 198/5 200/6 200/13 204/22 205/5</p> <p>cases [5] 19/4 46/7 92/21 92/23 120/2</p> <p>cast [14] 37/25 98/18 99/7 99/11 154/1 161/5 161/9 163/15 165/11 166/21 166/22 167/4 167/15 167/21</p> <p>catch [6] 71/23 72/1 166/13 166/15 174/21 175/1</p> <p>categories [1] 43/6</p> <p>category [1] 42/19</p> <p>cause [5] 24/19 69/13 98/19 122/13 171/19</p> <p>caused [5] 47/21 69/5 69/6 69/6 164/6</p> <p>causing [2] 99/4 132/1</p> <p>CDs [2] 75/20 75/23</p> <p>Center [1] 74/17</p> <p>centers [2] 56/11 94/3</p> <p>central [1] 88/5</p> <p>certain [7] 75/4 90/6 109/23 110/13 156/19 193/1 193/2</p> <p>certainly [23] 6/23 11/25 12/23 16/16 17/10 32/11 43/6 46/7 48/12 60/13 60/18 62/7 70/8 82/16 85/3 99/8 108/10 116/10 130/17 132/10 166/6 206/16 206/19</p> <p>certificate [2] 152/13 159/2</p> <p>certification [1] 92/4</p> <p>certified [5] 10/2 88/15 203/8 206/13 206/17</p> <p>certify [1] 208/8</p> <p>cetera [1] 66/18</p> <p>chain [11] 21/16 21/20 22/3 35/18 59/18 59/21 60/3 116/14 116/16 118/9 118/24</p> <p>chambers [6] 5/13 36/23 36/25 37/16 37/19 200/18</p> <p>chance [2] 170/20 203/14</p> <p>change [24] 14/20 26/23 38/22 38/23 39/4 39/20 47/14 47/22 50/10 53/12 60/24 63/8 65/17 65/17 71/4 72/1 75/7 77/21 80/16 96/3 100/16 114/10 138/16 205/21</p> <p>changed [14] 20/19 34/6 34/7 36/8 38/24 47/8 48/15 48/18 72/15 87/15 125/10 133/8 156/9 161/9</p> <p>changes [14] 24/12 25/12 28/17 39/8 39/25 47/21 50/12 60/24 64/25 66/16 100/8 120/6 178/17 178/21</p> <p>changing [9] 13/2 49/25 98/23 109/19</p>
<p>C</p> <p>cable [5] 34/14 35/8 35/8 116/19 116/20</p> <p>California [7] 90/7 91/9 93/24 93/25 94/1 94/8 197/3</p> <p>call [15] 5/21 6/3 6/7 6/7 6/9 6/14 11/8</p>		

<p>C</p> <p>changing... [5] 112/5 120/10 122/4 124/14 165/10</p> <p>chaos [7] 98/5 98/10 98/14 98/22 122/13 122/19 137/2</p> <p>chapter [1] 130/9</p> <p>chapters [1] 130/7</p> <p>character [4] 27/12 42/17 46/8 119/12</p> <p>characterize [1] 106/15</p> <p>characterized [1] 124/19</p> <p>charge [1] 179/11</p> <p>chatting [1] 83/8</p> <p>cheat [4] 59/11 64/17 66/5 66/17</p> <p>cheating [1] 24/23</p> <p>check [21] 49/21 53/3 53/6 131/8 132/2 132/5 132/7 154/5 155/23 156/3 164/24 165/2 165/4 165/5 165/6 165/12 165/14 165/14 166/18 167/14 173/20</p> <p>checked [5] 62/11 62/13 165/19 190/4 197/4</p> <p>checking [7] 50/21 51/7 53/1 68/9 71/18 155/19 156/11</p> <p>checks [1] 165/7</p> <p>chief [2] 150/11 150/16</p> <p>child [1] 52/1</p> <p>chip [1] 35/8</p> <p>choice [2] 94/8 165/10</p> <p>choices [3] 68/16 154/9 155/7</p> <p>choose [1] 58/5</p> <p>choosing [3] 30/17 157/14 174/5</p> <p>CHRISTIAN [2] 2/10 126/11</p> <p>circumstances [1] 65/25</p> <p>CISA [30] 12/13 12/16 12/20 12/21 13/1 13/12 19/17 19/25 20/5 20/15 20/19 20/22 22/23 24/13 27/8 58/20 99/15 100/23 114/11 114/23 115/25 116/3 116/25 118/11 118/22 192/25 193/22 193/25 194/5 194/9</p> <p>CISA's [9] 21/24 21/24 24/18 58/17 115/7 116/13 116/22 118/5 118/22</p> <p>cite [1] 1/4</p> <p>cited [2] 55/23 55/24</p> <p>City [2] 153/11 208/10</p> <p>Civil [1] 108/21</p> <p>claim [3] 100/21 169/7 169/8</p> <p>claiming [2] 18/25 164/6</p> <p>claims [1] 72/19</p> <p>clarification [2] 45/11 144/20</p> <p>clarify [8] 36/4 83/16 92/25 94/7 104/5 164/13 174/4 189/18</p> <p>clarifying [1] 111/9</p> <p>clarity [2] 184/18 192/5</p> <p>class [1] 117/3</p> <p>clear [36] 6/2 33/25 37/16 38/23 39/7 41/8 43/24 54/22 59/22 63/23 64/21 65/9 72/6 75/14 79/15 103/6 104/5 104/10 105/16 106/20 129/12 133/12 138/11 159/5 159/12 179/2 179/4 181/16 183/11 185/9 187/2 188/16 199/16 200/9 200/22 205/20</p> <p>clearly [4] 30/19 30/20 191/17 206/15</p> <p>clerk [1] 197/12</p> <p>clerks [1] 197/25</p> <p>client [4] 181/23 197/24 201/3 201/7</p> <p>client's [1] 205/8</p> <p>clients [1] 197/25</p> <p>climate [1] 39/1</p>	<p>clinical [1] 153/7</p> <p>Clinton [1] 94/22</p> <p>clip [7] 140/8 140/10 150/21 151/23 198/9 198/16 199/8</p> <p>clips [2] 140/8 199/25</p> <p>close [4] 54/15 116/25 187/22 200/13</p> <p>closed [1] 63/8</p> <p>closing [1] 24/15</p> <p>CM [2] 1/2 1/3</p> <p>CM/ECF [2] 1/2 1/3</p> <p>co [2] 102/11 141/12</p> <p>co-counsel [1] 102/11</p> <p>co-plaintiffs [1] 141/12</p> <p>COALITION [3] 2/13 152/24 192/8</p> <p>code [47] 17/14 28/15 37/2 38/17 42/8 46/12 50/12 59/12 64/3 64/15 66/9 67/2 67/3 68/2 68/7 68/8 68/11 68/12 68/14 68/15 68/16 68/19 68/23 68/24 69/2 69/18 70/4 70/11 70/16 70/17 70/24 142/6 145/4 145/5 145/7 145/20 146/5 146/23 147/8 168/5 168/17 179/8 180/4 180/16 180/16 181/9 183/3</p> <p>code's [1] 70/1</p> <p>coded [1] 59/1</p> <p>codes [6] 15/1 48/2 67/22 68/3 69/23 117/11</p> <p>coding [1] 65/20</p> <p>Coffee [37] 11/6 24/5 24/6 25/4 25/14 33/21 43/1 43/5 43/11 43/19 44/4 44/11 44/13 44/24 45/7 67/11 85/16 85/16 85/21 85/25 86/1 86/6 86/13 86/17 86/23 87/10 114/22 116/5 116/13 120/11 120/12 120/14 120/15 120/20 138/23 139/10 139/16</p> <p>cofounder [1] 204/9</p> <p>colleagues [3] 37/15 173/21 200/18</p> <p>collected [3] 86/13 87/4 87/4</p> <p>collecting [1] 161/25</p> <p>collection [1] 162/1</p> <p>collects [1] 161/18</p> <p>college [2] 153/4 153/5</p> <p>Colorado [4] 45/24 48/3 137/18 138/1</p> <p>come [26] 7/1 28/18 28/19 28/20 28/20 37/11 50/19 104/4 135/7 141/2 144/15 148/22 178/2 187/9 187/20 188/15 188/22 189/2 189/2 191/9 195/10 195/14 196/15 200/19 202/24 206/10</p> <p>comedian [1] 183/18</p> <p>comes [4] 69/19 144/3 151/2 189/5</p> <p>comfortable [2] 38/7 187/16</p> <p>coming [11] 48/24 144/23 148/15 149/8 156/24 170/6 170/7 180/24 186/25 189/6 205/5</p> <p>command [1] 121/1</p> <p>commercial [1] 27/20</p> <p>commission [4] 10/3 30/13 30/15 202/18</p> <p>Commission 2 [1] 202/18</p> <p>commit [1] 131/6</p> <p>Committee [1] 135/22</p> <p>common [1] 173/14</p> <p>communicate [2] 11/2 84/18</p> <p>communicated [1] 84/24</p> <p>communications [1] 115/19</p> <p>community [1] 158/5</p> <p>compare [6] 57/12 57/15 70/11 101/19 122/2 155/12</p> <p>compared [4] 28/24 32/15 41/16 55/13</p>	<p>comparing [3] 100/2 100/4 102/3</p> <p>comparison [3] 68/13 103/19 125/5</p> <p>compile [2] 67/2 67/3</p> <p>complaint [45] 141/22 145/22 145/23 177/19 177/21 178/9 178/11 178/14 179/12 179/15 179/17 180/3 180/14 180/21 181/1 181/8 181/10 181/15 181/17 181/18 181/20 182/18 182/23 183/2 183/25 184/9 185/12 185/18 186/19 186/21 187/4 187/7 188/3 188/9 188/10 188/12 188/14 188/17 189/8 189/9 189/10 190/11 190/21 190/22</p> <p>complaints [14] 177/3 177/5 179/14 179/16 179/22 180/23 186/13 188/21 188/24 189/2 189/3 190/15 195/7 195/10</p> <p>complete [6] 38/21 123/9 128/17 129/21 152/10 199/21</p> <p>completed [3] 136/7 178/4 186/17</p> <p>completely [10] 15/8 15/23 16/8 19/14 26/24 57/1 86/21 121/19 156/1 191/20</p> <p>complex [5] 56/7 70/6 71/10 71/12 97/16</p> <p>compliance [5] 21/16 21/21 21/23 21/25 146/10</p> <p>complied [2] 23/2 146/13</p> <p>complying [3] 22/3 22/24 23/13</p> <p>component [2] 15/14 75/15</p> <p>components [6] 33/13 35/6 35/13 43/13 44/3 67/4</p> <p>compromise [5] 40/24 41/25 42/1 119/25 120/1</p> <p>compromised [3] 9/21 85/13 168/12</p> <p>computer [7] 1/21 7/24 77/3 86/14 121/8 125/22 160/4</p> <p>COMPUTER-AIDED [1] 1/21</p> <p>conceal [2] 103/13 103/14</p> <p>concealing [1] 38/11</p> <p>concept [4] 112/20 113/5 113/7 113/14</p> <p>concern [13] 12/7 23/21 25/15 25/19 25/19 25/19 77/25 85/6 99/17 119/8 162/12 168/5 202/17</p> <p>concerned [7] 23/24 23/25 24/4 24/9 24/23 84/13 168/13</p> <p>concerning [3] 25/2 80/24 170/13</p> <p>concerns [19] 10/7 38/25 68/3 68/4 71/17 71/20 82/8 84/6 84/10 84/12 84/25 85/3 86/1 104/11 115/15 122/25 134/25 135/19 168/8</p> <p>conclude [4] 41/25 42/11 107/23 123/2</p> <p>concluded [4] 40/5 144/10 151/11 207/14</p> <p>concludes [2] 103/25 110/17</p> <p>concluding [1] 52/24</p> <p>conclusion [5] 19/4 61/14 111/5 112/25 178/24</p> <p>conclusions [2] 14/14 40/21</p> <p>conditions [1] 47/23</p> <p>conduct [10] 14/3 14/23 14/25 15/6 48/13 49/2 49/7 118/7 177/3 179/9</p> <p>conducted [8] 13/25 20/14 20/17 51/22 56/7 74/22 101/2 205/9</p> <p>conducting [4] 24/21 48/7 112/2 118/10</p> <p>conducts [5] 13/2 14/13 49/9 118/20 178/22</p> <p>confer [1] 11/3</p>
---	---	--

<p>C</p> <p>conference [11] 6/20 37/13 37/19 40/5 82/13 141/4 144/10 144/18 151/11 197/22 197/25</p> <p>confidence [4] 48/8 99/6 122/15 166/2</p> <p>confident [3] 11/16 48/17 165/22</p> <p>confidential [1] 186/17</p> <p>configuration [6] 33/15 33/24 43/8 134/10 137/22 138/14</p> <p>configure [1] 64/14</p> <p>confirm [3] 5/12 41/21 167/3</p> <p>confirmed [1] 27/9</p> <p>confused [1] 185/11</p> <p>confusing [2] 44/20 45/3</p> <p>confusion [1] 103/14</p> <p>Congress [3] 135/13 135/17 136/13</p> <p>connected [2] 22/7 22/11</p> <p>connection [2] 22/11 135/11</p> <p>consequence [1] 117/4</p> <p>consider [19] 16/14 28/24 30/17 31/5 31/9 32/1 34/4 34/10 34/14 77/20 83/24 89/11 104/9 105/25 106/4 106/21 107/3 195/12 205/16</p> <p>consideration [4] 12/1 109/8 120/7 177/14</p> <p>considered [14] 31/18 31/22 32/3 32/3 32/4 32/11 32/12 32/12 104/13 105/4 105/4 106/22 106/25 186/10</p> <p>considering [2] 77/11 77/15</p> <p>consistent [2] 115/7 179/8</p> <p>consistently [1] 146/12</p> <p>conspiracy [3] 5/10 103/20 103/20</p> <p>constitute [1] 208/9</p> <p>constituted [1] 110/8</p> <p>Constitution [2] 113/1 113/2</p> <p>constraints [1] 155/25</p> <p>consult [3] 102/11 105/16 107/18</p> <p>consulting [1] 200/16</p> <p>consume [2] 192/18 192/19</p> <p>contacted [1] 164/1</p> <p>contacting [1] 115/15</p> <p>contained [4] 69/20 180/23 181/15 199/4</p> <p>contemporaneous [2] 63/6 102/8</p> <p>content [2] 84/1 154/22</p> <p>contest [8] 24/23 47/8 47/11 49/14 66/18 75/9 131/18 131/20</p> <p>contests [5] 40/13 49/6 59/1 64/16 127/12</p> <p>context [9] 8/12 8/13 8/13 54/23 107/17 135/20 145/9 154/14 166/3</p> <p>contexts [1] 62/1</p> <p>continue [2] 152/1 194/17</p> <p>continued [5] 4/3 4/5 7/5 7/10 186/9</p> <p>continuing [1] 197/16</p> <p>continuously [1] 159/14</p> <p>contrary [1] 56/18</p> <p>control [1] 52/21</p> <p>controls [5] 9/10 9/14 16/10 104/14 112/1</p> <p>convenience [1] 198/22</p> <p>convenient [1] 198/23</p> <p>conversation [1] 65/9</p> <p>coordinate [1] 204/5</p> <p>coordinates [2] 46/16 46/21</p> <p>copied [1] 164/1</p> <p>copies [6] 126/4 129/12 129/13 138/3</p>	<p>207/4 207/5</p> <p>copy [16] 91/2 130/4 130/12 181/3 181/5 181/25 182/1 182/2 182/18 185/8 206/13 206/17 206/22 207/1 207/2 207/2</p> <p>corner [2] 52/7 182/12</p> <p>corny [1] 157/21</p> <p>correct [101] 12/25 15/2 20/16 25/7 29/3 29/5 33/8 33/11 33/14 33/22 44/6 46/18 47/6 50/16 52/2 52/4 73/22 75/3 80/19 81/1 81/23 83/20 85/17 91/17 92/23 96/12 100/22 103/1 112/15 112/18 125/2 125/5 125/10 125/12 128/3 129/5 132/12 146/5 146/6 154/20 155/3 158/24 159/3 159/15 159/20 159/21 159/25 160/2 160/5 160/8 160/19 161/2 161/3 161/6 161/10 161/14 162/10 162/14 162/16 162/21 162/23 163/2 163/5 163/20 163/25 164/10 164/18 165/17 165/23 165/24 165/25 166/1 166/7 166/19 166/22 167/1 167/4 167/11 167/15 167/22 168/24 168/25 169/3 169/7 169/15 170/4 172/8 173/11 173/18 174/6 174/9 174/11 176/22 185/21 186/14 186/18 187/12 187/13 195/13 204/12 205/12</p> <p>corrected [2] 9/6 75/1</p> <p>correcting [1] 9/5</p> <p>correctly [5] 29/19 70/13 99/3 99/11 171/16</p> <p>correctness [3] 8/16 55/2 55/4</p> <p>corresponding [1] 200/12</p> <p>corrupt [2] 62/24 62/25</p> <p>cost [5] 31/12 32/1 32/4 32/5 32/6</p> <p>costs [3] 32/5 32/7 32/8</p> <p>could [129] 9/3 9/7 14/3 15/6 15/17 15/19 15/23 16/4 16/18 17/14 19/16 19/20 22/15 22/19 27/3 35/7 35/10 35/11 35/18 35/18 36/25 37/2 38/13 38/14 39/12 41/5 42/8 47/5 47/20 50/5 55/8 55/19 56/22 57/12 58/25 59/11 59/15 59/25 60/2 60/18 61/6 62/20 62/25 63/1 64/6 67/12 67/21 68/14 69/13 70/1 70/19 72/13 73/9 73/14 74/1 74/2 74/22 75/1 75/4 75/8 76/5 76/16 82/1 84/7 84/8 84/23 86/3 88/2 90/21 95/24 96/3 97/10 98/13 98/17 102/11 102/25 103/1 103/13 105/15 105/17 106/15 106/15 108/18 109/24 110/3 110/12 111/8 112/23 113/15 115/2 115/11 119/8 119/9 119/13 120/19 120/24 120/24 121/2 121/2 122/5 122/7 123/8 123/24 127/4 129/4 129/13 132/25 133/1 137/1 142/10 149/20 154/25 157/11 164/5 168/2 168/12 168/15 169/19 173/17 177/16 177/18 184/25 188/15 188/15 196/13 198/11 201/6 202/22 203/15</p> <p>couldn't [7] 17/18 50/19 59/2 65/11 123/2 156/25 185/5</p> <p>counsel [21] 7/15 84/11 84/17 102/11 128/17 141/3 141/12 169/22 181/24 191/20 192/2 192/5 192/6 196/20 197/22 200/11 200/15 200/24 205/4 205/6 206/12</p> <p>counsel's [1] 200/16</p> <p>count [13] 46/11 46/16 63/12 63/14 82/2 88/5 94/23 103/1 103/6 141/25</p>	<p>155/8 164/20 202/20</p> <p>counted [12] 29/19 91/12 99/6 99/11 103/17 161/5 161/10 161/17 166/21 167/4 167/15 167/21</p> <p>counter [2] 199/3 199/17</p> <p>counter-designation [1] 199/17</p> <p>counter-designations [1] 199/3</p> <p>countermeasure [1] 14/6</p> <p>counters [1] 199/11</p> <p>counties [20] 14/3 15/23 18/15 18/18 19/11 21/13 21/20 22/2 22/23 23/1 23/7 23/13 25/22 26/5 73/18 91/24 92/7 92/9 93/25 143/8</p> <p>counting [1] 46/19</p> <p>country [3] 89/16 89/24 135/16</p> <p>counts [4] 94/24 142/12 142/13 189/24</p> <p>county [72] 5/2 7/20 10/9 10/12 10/25 16/2 17/20 18/20 21/22 24/6 24/6 25/4 25/9 25/14 33/21 43/1 43/5 43/11 43/19 44/4 44/11 44/13 44/24 45/7 45/24 62/11 67/12 69/4 73/16 85/16 85/21 85/25 86/2 86/6 86/13 86/23 87/10 88/9 93/3 93/15 94/7 112/14 112/16 114/22 116/5 116/13 120/11 120/12 120/14 120/16 120/20 137/21 138/23 139/16 141/24 147/3 153/17 155/1 159/6 159/14 163/20 163/24 164/10 169/3 169/4 169/15 184/12 202/14 202/18 202/25 203/3 206/14</p> <p>county's [3] 11/6 20/15 74/22</p> <p>couple [5] 56/21 58/13 82/17 103/25 107/24</p> <p>coupled [1] 75/15</p> <p>course [10] 11/10 24/18 26/6 48/9 57/15 123/10 204/7 205/6 205/25 206/7</p> <p>court [57] 1/3 1/6 1/9 1/1 1/23 4/9 5/12 7/15 11/23 12/4 12/10 32/22 34/8 34/19 36/12 37/2 38/10 40/11 50/6 53/18 54/1 54/2 54/3 54/19 78/8 84/11 84/18 109/2 109/7 109/8 109/12 109/15 110/10 110/17 110/22 112/15 134/20 140/22 158/11 159/12 173/10 177/18 180/20 197/15 198/11 198/20 198/24 200/1 200/11 201/5 201/25 205/1 208/6 208/7 208/10 208/17 208/17</p> <p>Court's [2] 12/1 198/22</p> <p>courteous [1] 140/20</p> <p>COURTHOUSE [1] 1/24</p> <p>courtroom [2] 34/3 40/15</p> <p>cover [3] 82/17 107/24 204/19</p> <p>covered [6] 18/16 41/15 64/8 104/12 173/6 193/14</p> <p>covering [1] 93/8</p> <p>create [3] 20/24 60/14 120/15</p> <p>created [1] 64/8</p> <p>creating [5] 13/9 66/22 66/23 73/24 156/22</p> <p>credibility [1] 101/7</p> <p>credible [2] 96/11 99/1</p> <p>crime [1] 131/6</p> <p>criticism [3] 78/6 78/17 79/5</p> <p>criticisms [3] 78/2 78/5 78/10</p> <p>criticized [1] 79/9</p> <p>criticizing [1] 79/16</p> <p>cross [21] 2/4 4/5 4/12 4/15 4/16 4/17 5/14 7/10 110/25 148/13 148/15 158/16 174/21 176/13 183/3 183/10 183/13 183/16 183/17 184/1 192/23</p>
---	--	--

<p>C</p> <p>cross-exam [1] 148/15</p> <p>cross-examination [10] 4/5 4/12 4/15 4/16 7/10 110/25 158/16 174/21 176/13 192/23</p> <p>cross-talk [1] 148/13</p> <p>crowded [2] 155/21 166/9</p> <p>CRR [3] 1/23 208/6 208/16</p> <p>crucial [1] 118/12</p> <p>cryptographic [4] 29/14 29/17 69/21 117/19</p> <p>cumulative [2] 6/16 47/13</p> <p>cumulativeness [1] 191/15</p> <p>curious [1] 195/25</p> <p>CURLING [4] 1/4 2/2 19/17 192/8</p> <p>current [7] 20/15 39/1 39/11 75/2 101/2 120/13 143/8</p> <p>currently [4] 22/24 47/25 176/20 181/12</p> <p>curtain [1] 157/23</p> <p>custody [7] 21/17 21/20 22/3 116/14 116/16 118/10 118/25</p> <p>CV [1] 1/6</p> <p>CVE [1] 58/21</p> <p>cyber [10] 44/8 45/8 45/18 45/20 45/23 95/1 95/21 137/10 137/11 138/17</p> <p>cybersecurity [9] 8/2 33/5 134/24 134/24 134/25 135/16 135/20 136/19 160/5</p> <p>cycle [1] 21/17</p>	<p>December [6] 82/8 84/6 84/25 85/3 156/3 156/4</p> <p>December 2020 [2] 82/8 84/25</p> <p>December 2nd [1] 156/4</p> <p>decided [3] 154/1 172/5 194/12</p> <p>decision [6] 30/16 30/18 30/21 59/11 97/4 169/2</p> <p>declaration [3] 108/5 108/6 139/15</p> <p>declarations [2] 31/25 148/17</p> <p>decode [5] 68/12 68/12 68/25 69/15 69/17</p> <p>decoding [1] 67/22</p> <p>decreased [1] 43/7</p> <p>deemed [1] 97/19</p> <p>deep [1] 37/1</p> <p>defend [2] 16/18 63/13</p> <p>defendants [10] 1/7 3/2 108/20 108/23 110/23 110/24 158/19 171/1 203/8 206/5</p> <p>Defendants' [2] 51/5 51/10</p> <p>defender [1] 122/18</p> <p>defense [2] 181/24 200/16</p> <p>defenses [3] 9/20 9/20 9/22</p> <p>defer [2] 37/3 39/2</p> <p>deferring [1] 140/23</p> <p>define [2] 107/15 107/16</p> <p>defined [1] 54/25</p> <p>definitely [4] 154/7 157/19 160/22 160/22</p> <p>definition [8] 34/5 34/9 49/25 50/7 50/11 64/14 69/3 107/4</p> <p>definitions [2] 64/12 64/16</p> <p>degree [15] 11/24 27/9 28/18 29/2 32/22 32/24 41/9 41/10 74/10 76/17 76/21 87/15 153/4 153/6 153/9</p> <p>degrees [4] 8/1 8/7 27/7 33/4</p> <p>DeKalb [6] 69/4 202/14 202/18 202/25 203/3 206/14</p> <p>delay [2] 98/19 99/4</p> <p>delayed [1] 5/9</p> <p>deleted [1] 88/2</p> <p>deliberative [1] 187/19</p> <p>delivered [1] 5/13</p> <p>Democracy [3] 184/10 186/6 186/22</p> <p>Democrat [1] 154/19</p> <p>democratic [1] 85/9</p> <p>demonstrate [1] 50/4</p> <p>demonstrated [8] 34/19 34/22 42/8 46/25 49/17 50/14 109/9 116/18</p> <p>demonstrates [1] 110/18</p> <p>demonstration [22] 34/2 34/8 35/16 36/13 36/14 40/15 40/16 50/3 50/6 50/15 54/19 59/5 59/25 64/16 66/12 99/16 108/18 109/16 109/21 110/2 150/6 150/9</p> <p>demonstrations [2] 34/1 36/7</p> <p>demonstrative [3] 108/12 110/7 110/11</p> <p>department [2] 49/5 179/15</p> <p>depending [4] 6/14 9/7 69/1 122/10</p> <p>depends [7] 61/7 62/2 63/3 75/6 77/24 106/24 122/10</p> <p>deployment [1] 75/24</p> <p>deposition [14] 140/10 151/15 191/10 191/24 193/7 193/14 194/1 194/13 198/4 198/18 199/25 200/2 200/12 205/23</p> <p>depth [1] 101/8</p>	<p>describe [7] 35/3 41/13 50/2 154/22 177/18 180/20 186/20</p> <p>described [7] 36/6 71/17 79/3 158/10 165/15 177/13 184/14</p> <p>describing [1] 201/25</p> <p>descript [1] 39/21</p> <p>descriptions [1] 127/12</p> <p>design [6] 13/8 28/8 42/15 120/3 120/7 134/12</p> <p>designation [2] 199/16 199/17</p> <p>designations [10] 193/9 193/15 193/16 198/18 199/3 199/3 199/7 200/10 200/12 205/23</p> <p>designed [15] 17/4 35/22 35/25 36/7 36/16 42/11 42/11 42/17 60/15 60/17 61/24 119/3 119/7 121/21 127/7</p> <p>despite [2] 42/4 143/21</p> <p>destroyed [1] 143/20</p> <p>detached [1] 79/5</p> <p>detail [4] 104/12 105/13 136/2 137/16</p> <p>detailed [2] 89/22 102/17</p> <p>details [4] 131/19 131/22 141/21 186/16</p> <p>detect [24] 9/24 14/4 14/19 47/5 47/9 47/10 47/12 47/16 47/19 47/20 47/24 48/1 48/6 62/13 62/21 62/21 62/23 74/7 74/7 75/11 75/13 118/12 122/23 125/4</p> <p>detectable [1] 62/1</p> <p>detected [11] 61/6 75/1 75/3 75/5 75/8 102/25 112/23 122/5 122/6 122/7 122/14</p> <p>detecting [4] 56/18 122/17 125/9 125/10</p> <p>detection [4] 56/23 61/2 103/18 124/20</p> <p>deter [1] 122/16</p> <p>determination [1] 178/13</p> <p>determine [2] 77/20 155/19</p> <p>determined [1] 40/23</p> <p>determines [1] 177/23</p> <p>determining [2] 76/18 179/11</p> <p>detouring [1] 70/21</p> <p>develop [2] 49/24 120/23</p> <p>developed [2] 36/10 40/12</p> <p>development [2] 38/6 77/2</p> <p>device [12] 35/1 35/4 41/22 50/8 58/16 61/10 61/25 66/12 93/19 108/19 117/1 167/24</p> <p>devices [12] 20/2 20/4 20/10 21/9 27/3 27/16 42/4 46/6 92/13 113/16 116/17 117/10</p> <p>DIANE [2] 3/7 158/18</p> <p>did [87] 7/14 7/17 7/18 17/1 30/12 32/1 34/1 35/16 38/22 39/4 39/12 43/17 43/18 49/24 52/4 52/17 53/2 53/4 54/10 55/15 57/3 57/19 59/7 59/12 64/3 68/14 68/18 80/20 82/8 83/16 84/12 85/17 86/9 86/12 87/5 94/22 94/23 95/19 96/3 102/20 105/25 106/3 106/4 106/6 106/12 107/8 107/24 111/12 117/2 120/25 121/15 121/16 121/17 125/2 125/4 129/16 131/20 136/7 136/12 153/2 153/9 153/11 153/12 155/8 157/24 160/21 160/24 160/25 163/7 163/10 164/23 165/2 165/4 169/25 170/1 174/24 184/10 186/9 187/5 192/5 197/18 198/17 202/24 203/1 203/2 205/24 207/1</p> <p>didn't [35] 12/24 16/25 33/13 37/7</p>
<p>D</p> <p>dagger [1] 183/20</p> <p>dancing [1] 38/10</p> <p>dangerous [3] 59/7 64/19 69/23</p> <p>DANIEL [1] 3/8</p> <p>DANIELLE [1] 3/8</p> <p>data [19] 22/25 23/4 23/5 23/7 23/11 43/11 45/7 60/24 67/11 69/14 74/1 110/8 121/2 137/16 137/21 138/10 138/17 139/10 204/2</p> <p>database [1] 89/23</p> <p>date [2] 25/7 45/6</p> <p>dates [1] 44/15</p> <p>DAVID [10] 2/4 2/23 2/24 142/10 146/2 176/15 183/10 183/13 183/16 183/17</p> <p>DAVIS [19] 2/19 2/21 2/22 4/20 176/17 182/9 182/12 191/19 192/2 201/3 201/11 201/14 201/18 201/23 202/7 202/8 202/9 202/9 202/10</p> <p>Davis 10 [1] 182/12</p> <p>Davis 7 [1] 202/8</p> <p>Davis 8 [2] 202/9 202/10</p> <p>Davis 9 [1] 202/9</p> <p>Davis' [2] 192/5 192/6</p> <p>day [14] 53/6 53/9 82/6 93/7 93/9 137/5 138/7 150/10 150/16 157/18 163/13 200/22 201/4 208/13</p> <p>days [6] 1/4 5/22 16/21 110/23 121/14 143/21</p> <p>de [2] 156/4 156/7</p> <p>dead [1] 135/10</p> <p>deal [6] 6/19 62/9 108/9 166/17 192/17 198/20</p> <p>dealing [3] 177/5 198/24 207/9</p> <p>deals [1] 31/16</p> <p>dealt [1] 191/17</p>		

<p>D</p> <p>didn't... [31] 38/23 41/1 59/13 60/8 64/5 64/18 65/8 76/21 85/18 86/4 95/19 96/1 106/21 107/7 120/4 120/6 128/23 131/6 131/20 133/6 157/3 159/11 163/9 163/10 163/11 163/17 163/22 163/24 172/15 174/24 192/16</p> <p>Diego [1] 93/25</p> <p>difference [5] 16/11 42/17 103/22 133/4 172/23</p> <p>different [27] 14/17 18/19 18/21 18/23 27/14 27/25 28/9 36/7 37/25 38/17 39/13 40/9 46/9 64/11 66/13 79/1 95/6 101/10 102/4 119/20 120/1 123/21 138/14 140/7 170/23 189/12 198/7</p> <p>differently [1] 81/18</p> <p>difficult [12] 16/16 28/22 69/23 82/4 103/16 138/6 138/6 149/8 154/10 154/13 155/25 156/16</p> <p>difficulties [1] 174/6</p> <p>difficulty [5] 106/1 106/20 106/22 106/22 106/25</p> <p>DIGGES [4] 2/13 2/13 2/18 2/18</p> <p>digital [2] 101/19 102/7</p> <p>diligent [1] 17/11</p> <p>diligently [2] 20/20 117/14</p> <p>direct [8] 4/11 4/17 66/13 67/14 148/15 152/18 194/7 194/24</p> <p>directed [2] 115/20 145/16</p> <p>direction [4] 48/11 80/15 115/6 179/17</p> <p>directly [3] 13/19 29/18 57/15</p> <p>director [1] 164/2</p> <p>disabilities [1] 173/13</p> <p>disable [1] 117/17</p> <p>disabling [1] 24/17</p> <p>disagree [1] 79/21</p> <p>disappeared [1] 15/19</p> <p>disclosed [3] 108/21 110/9 173/16</p> <p>disclosure [1] 110/21</p> <p>discover [3] 12/24 120/21 128/6</p> <p>discovered [2] 120/22 123/23</p> <p>discovery [2] 77/10 206/5</p> <p>discrepancy [1] 166/15</p> <p>discuss [10] 7/14 7/18 38/13 46/1 52/19 67/7 67/15 67/21 69/22 77/17</p> <p>discussed [25] 5/13 5/14 10/22 12/22 13/1 14/7 16/13 36/15 36/22 38/12 59/22 60/4 60/20 72/12 73/20 75/19 85/1 87/14 87/17 88/9 98/16 104/14 104/17 134/3 134/21</p> <p>discusses [3] 36/2 51/21 60/6</p> <p>discussing [4] 46/10 67/5 136/1 136/3</p> <p>discussion [5] 10/5 36/25 50/21 94/14 192/17</p> <p>discussions [3] 15/9 61/1 88/17</p> <p>dishonest [1] 73/4</p> <p>disinformation [1] 136/23</p> <p>display [1] 19/21</p> <p>dispositive [1] 123/10</p> <p>dispute [1] 197/23</p> <p>disrupt [1] 192/3</p> <p>disseminated [2] 137/13 137/25</p> <p>distance [1] 140/6</p> <p>distinction [1] 76/10</p> <p>distinguish [1] 62/22</p> <p>distributed [4] 138/17 138/24 139/11 139/12</p>	<p>district [8] 1/1 1/1 1/12 109/7 208/4 208/7 208/7 208/17</p> <p>diversity [1] 19/12</p> <p>DIVISION [2] 1/2 208/8</p> <p>do [199] 6/21 10/11 10/15 10/24 11/5 13/16 15/11 17/14 17/14 18/15 18/20 20/7 22/2 22/23 26/2 31/7 35/7 35/9 41/18 46/2 46/10 48/13 48/22 49/6 50/24 52/9 52/16 53/14 55/13 55/20 56/12 56/20 57/22 58/3 58/7 58/8 60/6 63/21 64/25 65/16 67/23 68/10 69/16 71/9 71/21 72/13 73/1 74/3 74/14 74/18 75/6 75/12 76/17 77/6 77/9 77/13 77/19 77/23 78/21 79/1 79/5 80/3 82/17 82/25 84/6 87/23 89/15 89/24 90/8 90/16 91/14 91/24 92/15 92/25 96/18 98/7 98/8 98/10 100/2 100/4 100/6 100/7 104/17 105/5 105/22 105/23 106/15 107/6 107/19 112/9 113/10 114/19 115/17 116/5 118/1 118/3 118/16 118/17 119/17 124/16 125/24 126/21 127/8 127/14 127/15 127/16 127/17 127/25 129/2 130/25 131/16 132/3 132/10 132/13 133/10 134/4 134/5 137/12 137/24 139/1 139/4 139/6 140/8 141/17 141/23 142/5 142/6 142/9 143/1 143/7 146/8 147/2 147/17 147/21 148/20 149/6 149/24 150/6 150/7 150/8 150/9 150/10 150/24 151/6 151/17 151/17 151/18 153/4 153/5 153/6 153/14 153/16 153/17 153/18 153/21 154/4 155/6 156/10 156/25 158/6 158/6 158/13 158/14 161/4 165/11 165/16 166/18 166/20 166/23 168/24 171/14 171/17 173/10 177/11 178/18 181/1 181/3 181/8 181/13 182/15 183/24 185/22 189/16 194/1 194/3 194/20 195/14 197/5 197/16 197/18 197/18 197/19 197/21 203/20 204/22 205/7 206/2 206/19 208/8</p> <p>docket [2] 1/5 1/5</p> <p>doctor [2] 195/25 200/3</p> <p>doctorate [2] 153/9 159/17</p> <p>document [31] 1/8 54/22 54/24 76/21 97/10 115/3 125/14 125/21 126/13 180/24 182/11 182/15 183/1 183/25 184/19 188/4 188/7 202/8 202/12 202/13 202/15 202/24 203/1 203/11 203/15 203/21 203/24 203/25 204/3 204/4 206/8</p> <p>documented [1] 41/17</p> <p>documents [11] 185/18 186/12 186/14 190/1 190/2 201/4 201/7 202/1 206/5 206/6 206/9</p> <p>does [42] 22/17 45/9 49/2 49/7 49/9 55/3 55/6 71/10 91/4 91/21 92/15 102/19 104/4 106/14 109/18 110/6 112/22 113/14 116/11 116/21 122/1 122/8 122/25 134/10 149/21 154/22 164/21 177/1 177/13 178/1 178/2 178/2 178/16 181/20 183/12 183/12 184/14 189/16 199/11 199/17 199/19 202/15</p> <p>doesn't [30] 22/16 26/22 27/1 28/11 48/11 71/20 76/1 76/8 77/17 77/20 77/23 77/23 89/10 90/2 97/5 98/22 99/4 100/15 100/21 122/10 122/18 140/25 147/10 161/21 166/11 172/22 184/4 190/25 191/23 198/13</p>	<p>doing [20] 38/3 48/9 54/14 61/17 62/2 62/3 68/24 74/2 77/5 105/7 105/9 105/10 118/4 123/13 164/4 171/6 180/10 191/14 198/15 204/15</p> <p>dollars [2] 136/11 136/14</p> <p>domestic [1] 137/5</p> <p>Dominion [57] 10/1 11/12 11/14 11/18 11/19 12/17 12/18 15/7 15/14 17/5 17/20 19/1 20/24 24/14 26/18 32/15 32/18 33/7 40/23 42/1 42/22 43/10 44/2 45/15 45/20 46/10 52/4 53/23 53/25 54/4 60/11 60/16 63/23 70/22 71/8 71/15 72/20 74/3 74/14 80/21 81/22 82/1 84/7 88/19 88/19 88/23 92/7 101/2 102/15 115/16 115/20 137/18 137/19 141/24 179/23 186/5 186/21</p> <p>don't [125] 5/7 10/13 11/7 11/9 12/2 12/3 12/3 12/9 13/10 16/13 18/17 18/23 20/17 22/16 23/11 23/17 23/20 26/12 26/12 27/24 28/2 28/4 37/21 38/9 38/18 39/3 39/13 41/3 44/9 45/5 45/22 48/23 48/23 49/21 54/16 56/20 58/6 61/19 62/22 63/9 69/16 71/3 74/20 75/4 78/20 82/3 82/24 83/9 85/12 85/14 87/14 87/19 90/20 96/2 96/6 96/6 96/23 97/6 97/16 103/3 104/10 107/3 118/23 124/4 124/8 128/19 131/19 131/22 133/19 138/9 139/2 141/2 142/19 142/25 144/7 144/22 146/16 147/9 147/14 147/14 147/15 148/20 154/14 158/2 160/1 160/3 161/7 161/8 161/11 161/12 162/7 162/8 162/11 166/14 167/13 169/6 171/19 172/16 175/15 175/19 175/23 180/24 181/5 182/24 182/25 183/18 184/6 184/7 184/8 186/12 187/7 187/21 187/24 188/8 188/10 188/14 189/8 190/22 190/24 194/2 194/6 198/24 199/17 199/21 203/11</p> <p>DONALD [1] 3/9</p> <p>done [24] 17/15 29/13 35/18 35/18 49/10 49/15 50/5 59/25 60/18 62/5 64/7 73/12 73/14 105/13 106/13 106/15 118/23 135/19 136/5 144/16 150/13 193/17 200/22 205/6</p> <p>DONNA [3] 1/4 2/2 2/2</p> <p>door [1] 204/25</p> <p>double [1] 165/19</p> <p>double-checked [1] 165/19</p> <p>doubt [7] 98/15 98/18 99/2 99/10 99/17 101/1 122/15</p> <p>dovetails [1] 151/24</p> <p>down [8] 15/20 52/7 56/21 68/18 187/1 198/12 205/2 206/21</p> <p>downed [1] 5/8</p> <p>download [1] 138/1</p> <p>downloaded [1] 203/1</p> <p>Dr [3] 38/5 197/1 197/23</p> <p>Dr. [114] 5/6 5/20 6/25 7/2 7/12 7/20 12/12 13/24 17/19 19/24 22/22 25/4 27/2 28/2 28/4 29/5 30/12 36/4 37/1 38/22 40/8 40/21 45/15 51/4 51/15 53/23 58/13 61/24 65/19 66/22 71/15 76/1 78/9 79/8 80/18 83/2 83/23 84/6 85/15 87/10 88/21 89/15 91/2 92/20 94/7 97/9 97/22 98/5 99/9 101/7 101/13 102/15 103/25 104/8 105/1 105/3 105/25 108/12 109/11 109/12 109/18 109/23 110/1 110/16 110/25 111/20</p>
--	---	---

<p>D</p> <p>Dr.... [48] 111/25 113/3 114/10 115/17 120/10 122/4 124/5 124/8 124/11 124/14 128/22 129/7 129/9 129/19 129/23 129/24 129/25 130/1 130/22 133/14 147/25 148/25 149/16 149/19 149/22 150/5 150/7 150/11 152/20 154/4 157/14 158/8 158/18 173/9 173/24 175/8 175/15 176/15 186/13 191/11 192/14 192/25 195/2 195/14 195/21 196/23 198/4 200/5</p> <p>Dr. Gilbert [3] 28/4 124/11 200/5</p> <p>Dr. Gilbert's [2] 28/2 124/8</p> <p>Dr. Halderman [74] 5/6 6/25 7/2 7/12 7/20 12/12 13/24 17/19 19/24 22/22 25/4 27/2 29/5 30/12 36/4 37/1 38/22 40/8 40/21 45/15 51/4 51/15 53/23 58/13 61/24 65/19 66/22 71/15 76/1 78/9 79/8 80/18 83/2 83/23 84/6 85/15 87/10 89/15 91/2 92/20 94/7 97/9 97/22 98/5 99/9 101/13 102/15 103/25 104/8 105/1 105/3 105/25 109/18 110/1 110/25 111/20 111/25 113/3 114/10 115/17 120/10 122/4 124/14 128/22 129/7 129/9 129/19 129/23 129/25 130/22 133/14 150/5 150/7 150/11</p> <p>Dr. Halderman's [8] 88/21 101/7 108/12 109/11 109/12 109/23 110/16 130/1</p> <p>Dr. Jan [1] 5/20</p> <p>Dr. Johnston [9] 147/25 176/15 186/13 191/11 192/14 192/25 195/2 195/14 195/21</p> <p>Dr. Juan [2] 124/5 198/4</p> <p>Dr. Missett [7] 152/20 154/4 157/14 158/8 158/18 173/9 173/24</p> <p>Dr. Philip [1] 175/8</p> <p>Dr. Skoglund [1] 148/25</p> <p>Dr. Stark [5] 149/16 149/19 149/22 175/15 196/23</p> <p>Dr. Tyson [1] 129/24</p> <p>drafting [1] 109/18</p> <p>dramatic [1] 196/15</p> <p>dramatically [2] 71/1 74/9</p> <p>draw [2] 41/6 76/11</p> <p>drawbacks [1] 70/6</p> <p>DREs [2] 42/5 91/17</p> <p>DRIVE [1] 1/24</p> <p>drives [1] 17/6</p> <p>drop [3] 163/9 164/24 166/25</p> <p>dropped [1] 166/24</p> <p>druthers [1] 157/16</p> <p>dubious [4] 96/22 97/12 97/17 97/19</p> <p>due [1] 190/17</p> <p>duly [4] 7/8 152/17 176/12 201/19</p> <p>DUMA [1] 3/9</p> <p>during [11] 21/10 40/14 72/16 86/17 95/13 108/17 109/13 109/25 110/13 173/2 193/6</p> <p>duties [2] 177/2 179/7</p>	<p>eager [1] 49/6</p> <p>earlier [5] 91/14 111/13 112/6 127/22 195/4</p> <p>early [9] 44/21 94/8 143/20 156/3 156/4 158/4 160/11 163/13 163/14</p> <p>ease [2] 31/14 77/9</p> <p>easier [3] 41/25 87/18 154/8</p> <p>easily [3] 56/6 73/13 106/15</p> <p>easy [4] 82/4 102/18 125/12 203/7</p> <p>ECF [2] 1/2 1/3</p> <p>education [2] 160/1 160/4</p> <p>EDWARD [1] 3/5</p> <p>effect [6] 47/13 57/3 66/14 74/24 87/5 183/3</p> <p>effective [9] 14/6 14/11 52/21 56/17 56/17 56/18 112/1 118/1 136/16</p> <p>effectiveness [1] 126/24</p> <p>efficient [2] 68/20 68/22</p> <p>effort [2] 73/2 205/14</p> <p>efforts [1] 202/2</p> <p>eight [1] 164/20</p> <p>either [15] 8/5 12/4 22/5 44/10 63/13 63/19 75/5 94/8 98/3 114/1 132/19 133/3 133/6 165/10 181/5</p> <p>elected [1] 85/10</p> <p>election [178] 8/14 8/14 8/19 10/2 10/18 11/6 13/4 13/25 15/10 16/9 17/23 20/2 21/17 22/7 23/6 23/8 23/9 23/10 24/7 24/22 26/24 27/4 27/17 29/6 29/10 29/23 29/25 30/9 30/13 30/14 30/15 31/3 31/6 31/8 31/17 31/19 31/20 32/4 32/16 33/13 40/16 41/17 41/19 47/14 47/22 48/25 49/18 52/2 53/6 53/9 54/5 54/8 54/23 55/7 56/10 59/3 61/15 63/8 64/14 64/23 65/4 65/11 66/13 67/21 69/3 69/14 69/19 69/20 73/4 73/16 73/21 73/23 73/24 74/17 75/7 75/24 76/6 76/12 77/14 77/22 77/24 82/6 93/7 93/9 94/22 95/7 95/14 96/21 97/25 98/3 98/6 98/19 98/22 98/24 99/1 100/2 100/3 100/4 100/5 100/7 100/8 100/18 101/1 107/4 108/1 108/24 108/25 109/25 110/14 112/8 115/5 115/6 117/18 117/20 118/7 118/23 122/8 122/15 122/22 122/25 125/7 128/7 129/5 131/18 131/20 132/13 135/9 135/20 136/15 136/23 136/25 137/1 141/7 141/18 143/4 143/14 143/21 144/2 157/18 158/1 160/2 160/8 160/11 160/18 161/1 161/5 161/12 161/18 162/8 162/12 163/1 163/23 164/18 168/25 169/1 171/23 176/21 177/1 177/10 177/22 177/23 178/7 178/8 178/13 178/16 179/7 179/8 184/10 186/7 186/14 187/20 189/12 190/1 190/2 190/3 195/5 204/2 206/13</p> <p>election-related [1] 136/23</p> <p>elections [50] 10/2 10/21 13/2 23/6 46/1 46/5 49/11 55/1 56/7 60/10 64/9 64/11 74/15 74/22 77/18 77/19 77/25 84/14 87/11 98/10 99/5 99/19 99/22 99/24 100/15 100/21 107/12 109/16 109/17 110/5 110/7 116/7 118/19 120/13 122/9 125/23 134/25 135/5 135/22 158/13 160/14 160/23 163/7 164/20 177/3 177/8 178/22 179/10 202/14 203/4</p> <p>electronic [1] 167/24</p>	<p>elicit [5] 6/22 147/11 181/17 187/25 190/24</p> <p>eliminate [1] 13/3</p> <p>else [12] 6/24 13/2 62/3 80/10 105/6 106/17 139/17 169/22 199/6 207/3 207/8 207/10</p> <p>else's [1] 190/18</p> <p>elsewhere [1] 93/23</p> <p>emergency [1] 98/20</p> <p>emphasizes [2] 24/18 24/21</p> <p>EMS [20] 23/7 33/15 33/21 33/21 33/23 69/20 74/3 74/19 74/22 84/9 88/4 88/14 116/12 120/16 134/6 134/10 137/18 137/20 138/13 146/20</p> <p>EMSs [1] 74/3</p> <p>enable [1] 38/22</p> <p>encoded [1] 46/12</p> <p>encompassed [1] 11/23</p> <p>encompasses [1] 137/3</p> <p>encountered [1] 5/8</p> <p>encouraged [1] 52/16</p> <p>encrypted [1] 17/6</p> <p>end [14] 20/7 29/13 29/13 38/9 63/6 74/6 75/1 79/22 82/16 110/2 111/20 151/19 178/1 206/12</p> <p>end-run [1] 79/22</p> <p>energy [1] 160/16</p> <p>engage [1] 79/13</p> <p>engagement [1] 112/7</p> <p>engaging [2] 106/21 114/6</p> <p>engineering [5] 13/8 16/9 67/15 67/18 120/3</p> <p>ENGLISH [1] 3/9</p> <p>enhanced [1] 20/10</p> <p>enormous [2] 32/8 91/8</p> <p>enormously [1] 103/16</p> <p>enough [8] 13/7 48/6 49/21 77/14 145/15 147/14 147/16 184/16</p> <p>ensued [3] 37/13 141/4 144/18</p> <p>ensure [7] 21/9 21/16 21/25 22/6 26/17 117/19 179/9</p> <p>ensured [1] 22/17</p> <p>ensures [1] 21/21</p> <p>ensuring [1] 21/23</p> <p>enter [2] 108/13 111/18</p> <p>entire [4] 98/19 123/19 129/11 130/7</p> <p>entitled [3] 78/14 80/8 171/2</p> <p>entity [2] 74/18 74/20</p> <p>entry [1] 1/5</p> <p>environments [1] 120/17</p> <p>envisioning [1] 63/4</p> <p>equipment [70] 10/1 10/9 10/12 11/6 11/14 12/17 15/10 15/14 15/15 15/20 15/21 17/20 19/2 21/13 22/11 24/7 24/10 25/16 25/18 29/23 30/1 30/23 30/25 41/17 42/22 43/1 43/15 52/4 54/4 54/12 64/22 65/11 72/20 84/7 85/16 85/22 85/25 86/7 86/10 86/23 87/22 88/1 93/7 95/13 95/16 95/25 98/20 104/13 111/12 112/1 112/3 112/12 112/14 115/24 116/6 116/12 116/15 131/13 136/10 136/12 136/25 137/1 138/8 138/9 138/11 138/15 162/13 171/23 172/24 184/10</p> <p>error [8] 62/20 62/22 69/4 119/18 171/17 180/17 181/9 191/19</p> <p>errors [9] 56/18 56/23 69/6 125/4 125/8 125/9 184/11 184/11 186/5</p>
<p>E</p> <p>EAC [4] 88/13 88/17 88/23 89/11</p> <p>each [18] 22/14 49/13 56/14 59/4 68/2 70/9 106/1 106/4 106/7 106/8 106/22 106/25 117/1 117/11 117/19 123/7 167/20 199/2</p>		

<p>E</p> <p>ES [3] 91/21 92/13 92/15</p> <p>escape [1] 103/18</p> <p>especially [3] 118/11 136/22 166/12</p> <p>essence [2] 49/23 138/13</p> <p>essentially [7] 34/24 68/9 123/5 138/12 202/13 204/6 204/14</p> <p>establish [2] 180/9 187/3</p> <p>established [3] 188/9 188/12 190/11</p> <p>esteemed [1] 135/15</p> <p>estimate [3] 26/2 26/4 154/25</p> <p>estimation [1] 99/5</p> <p>et [3] 1/4 1/6 66/18</p> <p>et cetera [1] 66/18</p> <p>eternally [1] 82/20</p> <p>EUW [2] 2/10 4/7</p> <p>evade [1] 77/10</p> <p>evaluate [1] 18/2</p> <p>evaluated [6] 17/19 17/22 17/23 18/25 19/3 19/6</p> <p>evaluating [1] 195/15</p> <p>evaluation [1] 204/11</p> <p>even [26] 14/11 14/17 15/13 24/7 45/7 68/7 85/25 87/25 102/23 121/2 122/7 123/9 123/13 124/11 125/1 125/5 129/6 132/13 135/4 136/25 147/14 154/15 158/2 174/15 187/21 190/11</p> <p>evening [1] 141/10</p> <p>event [4] 137/9 138/5 138/18 138/20</p> <p>events [1] 109/20</p> <p>ever [7] 16/2 16/6 25/24 158/25 161/9 165/18 175/1</p> <p>every [19] 7/24 11/18 12/15 15/13 25/24 25/25 50/7 50/13 70/4 77/4 99/9 100/21 118/23 123/2 158/2 160/8 160/11 161/1 164/18</p> <p>everybody [3] 39/2 196/22 207/3</p> <p>everyone [8] 45/9 135/3 173/1 190/18 192/1 200/21 201/12 207/10</p> <p>everything [3] 37/25 156/10 173/6</p> <p>evidence [53] 8/15 20/18 22/2 22/4 22/23 24/5 24/14 25/12 41/20 55/2 55/4 78/14 78/19 79/14 85/12 85/14 86/18 95/12 97/24 98/2 99/12 99/13 110/20 115/23 117/13 117/21 118/18 118/24 123/11 124/7 124/9 126/15 129/11 129/17 135/7 136/8 161/4 161/7 161/8 161/11 161/12 161/20 161/21 161/23 161/25 162/1 162/7 162/8 171/21 172/23 184/19 184/19 184/22</p> <p>evident [1] 131/2</p> <p>evolution [4] 134/23 135/19 136/9 136/18</p> <p>evolved [2] 135/1 136/19</p> <p>evolving [1] 136/10</p> <p>ex [1] 109/4</p> <p>exacerbates [1] 136/24</p> <p>exact [3] 43/8 45/6 120/16</p> <p>exactly [9] 57/15 57/24 77/1 81/3 90/20 119/17 132/4 146/16 199/7</p> <p>exam [2] 140/16 148/15</p> <p>examination [26] 4/5 4/6 4/7 4/8 4/11 4/12 4/13 4/15 4/16 4/17 4/21 7/10 110/25 111/23 123/8 130/20 134/18 152/18 158/16 174/1 174/21 176/13 191/6 192/23 194/24 201/21</p> <p>examine [2] 85/24 123/5</p>	<p>examined [3] 6/12 85/15 137/16</p> <p>example [8] 38/3 59/21 60/3 65/15 83/22 98/12 104/7 104/17</p> <p>examples [1] 106/16</p> <p>Except [1] 37/4</p> <p>exception [2] 203/12 203/16</p> <p>excerpt [5] 129/10 130/6 151/15 191/25 198/4</p> <p>excerpts [3] 136/1 191/10 199/9</p> <p>exchanged [1] 198/19</p> <p>excluded [1] 110/20</p> <p>exclusive [1] 9/17</p> <p>exclusively [1] 46/11</p> <p>excuse [11] 24/14 43/17 86/11 89/6 94/11 112/15 116/20 125/8 127/6 129/23 182/13</p> <p>excused [4] 139/21 175/5 195/23 207/10</p> <p>executing [2] 110/16 131/3</p> <p>exhibit [9] 14/12 14/18 19/17 51/5 51/10 55/8 108/22 182/10 184/2</p> <p>Exhibit 10 [1] 182/10</p> <p>Exhibit 1231 [3] 51/5 51/10 55/8</p> <p>Exhibit 89 [1] 19/17</p> <p>exhibits [2] 200/12 206/23</p> <p>exist [4] 28/3 46/5 81/22 82/7</p> <p>existed [1] 70/9</p> <p>existing [2] 110/19 181/17</p> <p>exit [1] 119/10</p> <p>expanded [1] 136/19</p> <p>expect [2] 6/9 58/1</p> <p>expected [1] 184/11</p> <p>expecting [1] 149/2</p> <p>expert [27] 12/22 27/8 36/2 36/6 40/12 43/3 51/22 69/22 92/20 94/15 96/15 99/18 104/22 108/23 109/11 109/14 110/9 110/19 135/23 145/10 148/10 151/16 159/22 196/13 197/2 200/16 204/25</p> <p>experts [9] 8/14 8/14 8/19 88/20 89/7 168/8 170/4 172/7 198/5</p> <p>explain [8] 65/22 65/23 66/18 68/6 78/15 80/4 119/4 189/6</p> <p>explained [2] 64/5 109/21</p> <p>explanation [1] 171/8</p> <p>exploit [5] 42/22 78/4 110/13 116/22 119/21</p> <p>exploitation [2] 19/25 20/11</p> <p>exploited [2] 109/24 118/13</p> <p>exploiting [1] 120/23</p> <p>exploits [1] 113/15</p> <p>explore [6] 38/16 38/18 39/8 39/12 111/6 113/22</p> <p>exploring [1] 78/11</p> <p>express [1] 164/3</p> <p>extent [6] 19/13 47/7 105/10 133/21 178/24 180/25</p> <p>external [1] 22/7</p> <p>extract [1] 105/2</p> <p>extreme [2] 27/9 136/22</p> <p>extremely [1] 120/5</p> <p>eyes [1] 174/18</p> <p>F</p> <p>face [7] 28/14 28/19 28/21 71/16 102/4 135/5 204/19</p> <p>faces [1] 8/9</p> <p>facility [3] 16/2 16/6 17/20</p>	<p>facing [1] 107/14</p> <p>fact [16] 16/13 16/20 56/18 91/10 96/11 103/10 103/13 139/6 143/7 143/8 150/12 155/8 187/7 204/20 205/9 205/24</p> <p>factor [11] 30/22 31/9 31/12 31/14 32/1 32/11 32/12 111/12 112/22 113/14 131/20</p> <p>factors [9] 12/1 30/16 30/19 31/5 31/18 31/22 31/24 46/23 171/18</p> <p>facts [1] 11/2</p> <p>factual [2] 145/18 145/19</p> <p>fail [1] 9/11</p> <p>fail-safe [1] 9/11</p> <p>failed [1] 9/21</p> <p>failure [1] 16/9</p> <p>failures [2] 8/17 136/25</p> <p>fair [10] 60/22 72/17 88/13 97/18 99/1 113/23 145/15 169/23 179/9 205/24</p> <p>fairly [1] 173/14</p> <p>fairness [1] 175/25</p> <p>faith [1] 122/14</p> <p>fall [2] 59/7 100/11</p> <p>falling [1] 70/2</p> <p>false [2] 69/5 69/13</p> <p>familiar [18] 78/6 112/20 113/4 113/7 117/23 122/20 180/18 180/19 182/23 183/1 183/2 183/19 184/7 185/13 185/19 185/23 186/1 192/25</p> <p>family [2] 139/24 140/3</p> <p>far [9] 49/15 98/10 135/4 165/20 165/22 186/19 190/12 194/13 205/3</p> <p>faster [2] 122/3 126/10</p> <p>favor [1] 93/18</p> <p>Favorito [1] 204/19</p> <p>fears [1] 175/2</p> <p>feasibility [6] 76/2 76/8 77/11 77/15 78/10 106/13</p> <p>feasible [4] 70/23 76/19 77/7 78/3</p> <p>feature [1] 117/18</p> <p>fed [4] 101/18 101/22 166/15 167/13</p> <p>federal [8] 108/21 135/7 136/12 143/10 143/21 146/10 146/10 160/14</p> <p>feed [3] 156/21 167/7 167/10</p> <p>feedback [1] 97/12</p> <p>feeding [2] 61/12 145/12</p> <p>feel [2] 178/4 198/23</p> <p>felt [6] 37/1 105/12 157/9 166/8 184/15 191/17</p> <p>few [8] 26/16 48/15 94/3 108/8 121/14 136/9 160/14 176/19</p> <p>fewer [1] 137/6</p> <p>field [2] 29/20 195/25</p> <p>fifth [2] 116/18 116/22</p> <p>figure [2] 56/25 199/22</p> <p>file [13] 23/9 34/5 34/9 50/1 50/7 50/11 67/15 67/18 107/4 108/24 144/2 199/23 205/24</p> <p>filed [9] 1/2 1/6 1/8 177/21 186/13 187/7 188/9 188/13 190/21</p> <p>files [5] 20/3 23/6 54/8 64/15 117/10</p> <p>filled [3] 28/15 57/23 58/4</p> <p>filled-out [2] 57/23 58/4</p> <p>filling [1] 132/17</p> <p>final [1] 199/15</p> <p>Finally [1] 69/14</p> <p>find [11] 55/19 56/17 85/17 85/18 86/4 105/1 118/1 123/16 129/5 144/7 166/16</p>
--	--	---

<p>F</p> <p>finding [2] 56/17 78/2</p> <p>findings [9] 84/23 96/23 97/3 99/15 104/11 127/6 135/21 178/12 181/16</p> <p>fine [12] 38/18 67/25 79/18 86/20 147/18 148/21 149/10 149/21 150/3 150/14 173/18 196/19</p> <p>finish [3] 6/16 159/9 201/13</p> <p>finished [5] 7/20 15/18 123/11 156/21 175/16</p> <p>finishing [1] 39/17</p> <p>firebomb [1] 98/13</p> <p>FIRM [1] 2/17</p> <p>first [46] 5/7 6/10 10/11 10/13 10/13 11/5 11/7 20/24 24/3 37/17 49/24 52/8 55/11 55/12 58/15 86/22 107/25 109/8 114/16 115/10 115/15 115/21 117/9 135/21 141/22 150/10 151/5 152/17 175/22 176/1 176/12 181/24 182/23 183/1 184/4 184/6 184/9 185/2 185/4 185/9 185/12 185/13 185/19 197/10 202/7 203/10</p> <p>FISHER [1] 2/5</p> <p>five [5] 53/16 53/19 82/22 144/15 170/9</p> <p>five hours [1] 170/9</p> <p>five minutes [3] 53/16 53/19 82/22</p> <p>five-minute [1] 144/15</p> <p>flagging [1] 38/8</p> <p>flaw [2] 119/11 119/11</p> <p>flipped [2] 36/17 123/17</p> <p>floating [1] 138/7</p> <p>fly [1] 107/19</p> <p>focus [1] 160/15</p> <p>FOERSTER [1] 2/7</p> <p>folks [5] 166/7 171/14 172/21 173/17 173/17</p> <p>follow [9] 39/4 113/10 127/22 130/1 134/17 149/22 171/11 174/3 206/16</p> <p>follow-up [2] 113/10 174/3</p> <p>followed [2] 109/14 166/6</p> <p>following [3] 1/1 39/18 128/5</p> <p>follows [8] 7/9 37/13 141/4 144/18 152/17 176/12 177/19 201/20</p> <p>forcing [1] 158/11</p> <p>foregoing [1] 208/8</p> <p>forensic [6] 15/9 22/25 23/4 23/5 85/15 123/7</p> <p>forge [2] 69/25 70/1</p> <p>forget [2] 18/6 124/18</p> <p>form [4] 60/2 61/7 63/12 133/5</p> <p>formal [2] 160/1 160/4</p> <p>formally [1] 108/4</p> <p>forming [2] 32/13 53/1</p> <p>forms [2] 14/9 59/4</p> <p>forth [2] 120/18 149/7</p> <p>forum [2] 45/4 45/6</p> <p>forward [5] 27/1 39/5 97/6 173/3 191/25</p> <p>found [22] 8/24 13/5 52/8 52/11 52/15 52/22 57/7 96/8 96/11 96/20 97/22 97/24 98/20 119/6 123/1 132/6 132/9 165/18 184/12 184/12 202/21 204/1</p> <p>foundation [4] 12/3 12/8 190/14 204/22</p> <p>four [3] 16/21 136/22 163/16</p> <p>four days [1] 16/21</p> <p>four years [1] 136/22</p>	<p>four-hour [1] 163/16</p> <p>fourth [3] 20/21 21/2 21/3</p> <p>fraction [8] 19/5 19/15 57/16 57/24 58/8 91/13 93/16 94/3</p> <p>frankly [3] 76/24 76/24 86/15</p> <p>fraud [3] 61/20 62/4 99/13</p> <p>free [1] 198/23</p> <p>frequency [3] 26/13 47/15 47/23</p> <p>frequently [3] 52/17 55/23 62/15</p> <p>fresh [1] 196/22</p> <p>Friday [1] 197/17</p> <p>friendly [2] 56/2 56/5</p> <p>front [12] 12/12 23/11 41/4 96/6 96/7 96/23 119/14 124/4 142/25 185/25 188/3 188/6</p> <p>full [13] 1/8 15/13 28/14 28/19 28/21 37/14 55/11 71/16 97/11 130/12 131/19 171/2 176/7</p> <p>full-face [4] 28/14 28/19 28/21 71/16</p> <p>fully [4] 12/5 69/17 71/20 203/14</p> <p>Fulton [14] 5/2 25/16 25/18 141/24 146/24 147/3 153/17 155/1 159/6 159/14 163/20 163/24 164/10 169/3</p> <p>fumbling [1] 149/9</p> <p>function [1] 74/16</p> <p>functionality [1] 67/13</p> <p>functioning [2] 128/13 169/24</p> <p>fundamental [1] 70/18</p> <p>funding [1] 136/12</p> <p>further [18] 20/10 52/22 52/24 58/9 69/17 79/12 97/6 103/14 127/19 128/19 128/21 134/14 136/5 161/21 189/6 191/4 191/6 201/21</p> <p>future [14] 30/2 40/16 65/3 77/25 86/14 99/14 99/24 100/7 100/15 109/25 120/13 122/9 122/16 158/13</p> <p>G</p> <p>GA [2] 203/25 206/6</p> <p>Gabriel [1] 122/20</p> <p>gained [1] 54/8</p> <p>game [1] 113/23</p> <p>Garland [1] 204/19</p> <p>gather [1] 188/10</p> <p>gave [2] 34/8 176/2</p> <p>general [9] 49/11 50/3 59/9 64/19 65/3 75/13 162/4 179/1 180/9</p> <p>generally [3] 8/23 66/23 134/25</p> <p>generates [3] 8/15 67/16 67/18</p> <p>generic [1] 52/6</p> <p>gentlemen [2] 144/11 190/17</p> <p>George [1] 49/17</p> <p>GEORGIA [129] 1/1 1/25 3/2 5/2 10/2 11/12 13/2 13/11 14/3 14/10 14/13 14/14 14/19 14/23 14/25 15/6 15/14 15/23 17/21 18/8 19/1 19/3 19/10 19/13 20/14 21/12 21/19 22/2 22/10 22/23 23/1 23/6 23/13 24/15 25/9 25/24 26/6 27/7 28/1 33/17 33/20 40/13 40/18 43/9 46/5 48/7 48/13 53/2 53/8 57/22 58/3 64/22 65/10 66/12 68/1 71/8 71/25 74/4 74/14 74/18 80/25 81/8 81/21 87/11 92/8 92/10 93/17 94/11 99/9 99/19 100/15 101/2 107/6 107/12 109/17 112/17 113/1 114/23 114/25 115/20 115/23 116/7 117/5 117/5 117/14 118/4 118/18 118/20 119/2 119/13 120/16 120/16 121/4 121/8 121/24 131/4</p>	<p>131/18 136/12 137/14 137/19 137/20 137/23 138/8 138/9 138/12 138/13 141/6 153/12 153/24 159/15 159/20 160/8 161/5 161/9 161/12 161/18 162/8 162/12 163/20 164/6 176/20 178/22 179/8 183/11 183/14 193/2 208/4 208/8 208/10</p> <p>Georgia's [14] 13/3 18/15 100/2 100/5 100/8 100/18 113/16 114/21 116/11 116/19 117/2 117/23 120/13 122/8</p> <p>get [39] 5/6 5/19 7/14 33/25 36/21 68/25 70/4 82/21 83/19 86/12 91/18 104/25 128/23 130/3 131/7 135/18 140/25 147/24 148/3 148/8 148/9 149/4 150/25 154/2 156/6 156/8 156/16 156/21 157/11 159/12 167/5 170/20 178/19 189/19 197/13 199/14 206/6 206/22 206/22</p> <p>gets [4] 147/13 166/15 187/17 191/21</p> <p>getting [7] 17/16 37/1 39/24 69/14 114/7 128/10 184/5</p> <p>Gilbert [11] 27/24 28/4 124/6 124/11 150/21 150/22 151/15 196/19 198/4 200/1 200/5</p> <p>Gilbert's [2] 28/2 124/8</p> <p>give [17] 23/21 29/18 39/19 48/16 90/2 90/2 90/12 108/14 119/19 123/21 126/10 154/25 160/15 170/10 171/2 182/20 199/20</p> <p>given [5] 65/4 73/10 79/1 136/13 188/7</p> <p>gives [6] 25/18 37/24 60/20 90/11 106/16 106/17</p> <p>giving [2] 126/4 171/8</p> <p>glad [3] 196/3 196/5 196/11</p> <p>glass [1] 173/4</p> <p>glasses [1] 172/9</p> <p>glitches [1] 169/23</p> <p>glitchiness [3] 171/19 171/20 171/22</p> <p>glitchy [3] 169/11 169/12 170/3</p> <p>globally [1] 138/2</p> <p>go [51] 10/5 23/15 23/20 40/2 40/6 49/20 53/21 55/11 79/12 82/18 83/3 83/7 97/6 97/6 97/19 100/15 101/8 103/17 113/24 121/23 123/4 123/16 123/16 129/4 132/10 133/21 140/13 140/16 147/21 148/25 150/3 150/11 156/23 157/23 158/23 162/2 166/16 168/2 172/5 175/11 175/17 177/20 179/6 180/10 184/16 193/10 193/18 194/14 197/13 201/9 201/11</p> <p>goal [1] 122/11</p> <p>goals [1] 107/16</p> <p>goes [5] 22/16 101/6 116/20 180/15 205/3</p> <p>going [103] 12/22 12/24 22/13 26/19 36/21 37/10 37/11 39/5 41/6 41/20 47/10 47/12 47/19 47/24 51/4 51/24 53/5 53/11 53/13 59/7 62/8 64/18 66/9 66/13 68/11 68/12 68/13 69/11 69/11 73/4 78/21 78/22 79/24 80/1 81/13 81/14 82/12 82/21 97/19 99/10 105/8 108/12 108/15 109/4 113/25 114/10 117/7 132/11 140/3 140/8 140/11 140/13 140/15 140/25 141/11 142/8 144/12 144/15 147/2 147/16 148/11 148/20 150/5 150/6 150/6 150/8 150/9 150/10 151/4 156/7 156/24 164/3 165/10 172/17 175/11 175/21 179/25</p>
--	---	--

G

going... [26] 180/5 180/6 180/13 182/9 185/5 187/1 187/19 189/17 189/19 192/18 192/19 192/21 193/17 197/13 197/16 197/18 197/19 198/12 198/20 199/20 199/22 200/3 200/10 200/11 203/9 204/16

gone [1] 194/13

good [21] 2/13 5/5 7/12 7/13 13/15 39/17 82/14 86/12 139/24 144/23 152/20 152/24 176/15 187/5 195/2 195/3 196/8 196/14 201/23 207/6 207/6

GOP [2] 183/11 183/15

got [11] 27/11 44/15 48/3 87/8 120/19 144/19 147/20 164/2 165/5 185/10 194/21

gotten [2] 94/2 187/21

govern [1] 8/11

GOVERNANCE [2] 2/13 152/25

government [4] 8/21 16/17 41/18 135/4

graduate [2] 77/4 153/6

graduates [1] 77/4

great [3] 104/12 105/13 136/2

greater [4] 12/7 32/20 32/23 32/24

greatest [1] 195/19

greatly [1] 102/6

Green [1] 94/20

grievous [1] 157/1

ground [1] 103/20

group [4] 2/11 5/22 30/14 51/17

growing [1] 137/5

guard [1] 20/10

guess [5] 37/10 65/8 173/1 187/10 191/14

gun [3] 59/13 60/8 64/5

guy [1] 145/12

GYN [2] 196/1 196/2

H

hack [11] 43/4 103/16 116/19 121/15 121/21 122/1 122/7 122/23 166/13 166/14 171/23

hackable [1] 167/24

hacked [16] 41/4 84/7 101/14 102/2 102/16 102/23 122/21 123/1 123/12 123/23 128/6 129/6 131/15 132/9 161/13 162/9

hacker [2] 95/24 96/3

hackers [1] 15/24

hacking [12] 82/9 96/20 97/22 97/24 98/2 103/13 103/14 122/3 128/2 132/1 160/5 168/11

hacks [3] 121/9 122/5 122/6

had [90] 5/5 5/20 5/21 9/15 10/7 10/8 10/12 10/24 11/6 15/13 35/8 35/12 37/16 38/17 40/8 40/9 43/10 43/13 43/19 44/2 44/21 45/4 45/7 45/7 50/19 50/23 52/5 60/17 62/4 68/18 69/4 71/23 84/25 85/6 85/21 85/24 86/6 86/13 86/14 86/17 86/25 87/1 87/3 87/4 87/5 87/25 88/16 95/12 103/25 105/13 108/8 121/18 123/1 123/8 123/23 128/6 132/9 137/8 138/18 140/7 141/5 146/8 148/17 153/25 155/15 156/14 156/17 156/20 156/24 157/16 158/23 161/17 163/9 164/4 164/15 168/19 174/6 187/11

187/13 187/13 191/9 191/24 195/24 196/6 203/14 205/24 206/1 206/5 206/18 208/9

hadn't [3] 70/14 116/24 187/12

HALDERMAN [77] 4/4 5/6 6/25 7/2 7/7 7/12 7/20 12/12 13/24 17/19 19/24 22/22 25/4 27/2 29/5 30/12 36/4 37/1 38/22 40/8 40/21 45/15 51/4 51/15 53/23 58/13 61/24 65/19 66/22 71/15 76/1 78/9 79/8 80/18 83/2 83/23 84/6 85/15 87/10 89/15 91/2 92/20 94/7 97/9 97/11 97/22 98/5 99/9 101/13 102/15 103/25 104/8 105/1 105/3 105/25 109/18 110/1 110/25 111/20 111/25 113/3 114/10 115/17 120/10 122/4 124/14 128/22 129/7 129/9 129/19 129/23 129/25 130/22 133/14 150/5 150/7 150/11

Halderman's [9] 88/21 101/7 108/12 109/11 109/12 109/23 110/16 130/1 151/24

half [4] 48/22 48/23 83/8 115/13

Hall [1] 11/8

HALSEY [1] 2/8

hammer [1] 98/17

hand [53] 16/11 29/7 29/11 29/25 30/5 30/6 30/8 46/6 46/15 55/13 56/15 57/11 63/1 63/2 63/5 74/4 74/5 74/23 74/24 75/5 75/14 80/22 80/25 81/8 81/13 81/18 81/19 81/21 82/2 101/16 102/1 102/24 103/17 123/22 127/24 128/7 132/15 132/18 132/20 132/21 132/23 133/10 133/15 147/4 152/7 153/21 153/24 167/6 167/18 168/3 176/4 202/20 208/12

hand-count [1] 202/20

hand-marked [46] 16/11 29/7 29/11 29/25 30/5 30/6 30/8 46/6 46/15 55/13 56/15 63/1 63/2 63/5 74/4 74/5 74/23 74/24 75/5 75/14 80/22 80/25 81/8 81/13 81/18 81/19 81/21 82/2 101/16 102/1 102/24 103/17 123/22 127/24 128/7 132/15 132/18 132/20 132/21 132/23 133/10 133/15 153/24 167/6 167/18 168/3

handed [6] 51/4 91/2 97/9 126/6 177/24 199/5

handful [1] 121/18

handle [3] 38/8 190/2 200/11

handling [1] 190/7

hands [1] 59/8

happen [6] 76/3 76/5 131/14 162/13 168/17 178/8

happened [9] 24/23 44/5 72/16 86/17 135/8 135/10 136/17 160/14 169/13

happening [2] 5/7 156/9

happens [3] 65/20 77/2 140/3

happy [2] 81/5 180/8

hard [13] 17/6 59/1 59/12 64/3 64/15 65/20 75/25 91/18 102/18 107/1 107/3 120/5 154/8

hard-coded [1] 59/1

harder [2] 154/15 160/15

hardware [4] 35/1 35/4 58/16 160/4

Harri [1] 18/5

Hart [1] 92/18

has [113] 1/6 7/24 12/6 21/12 21/19 22/10 22/17 23/1 24/15 25/25 26/20

27/7 27/8 27/9 27/9 27/24 28/5 28/8 29/19 30/17 48/15 48/18 48/18 48/20 49/15 51/24 53/15 61/20 62/4 62/5 69/5 69/5 69/24 70/16 74/20 76/13 78/8 93/16 99/1 99/10 99/13 99/15 100/23 101/18 102/16 104/12 104/23 108/14 111/21 114/3 115/23 117/14 117/21 118/18 121/5 121/20 122/17 123/12 133/19 134/24 135/3 135/7 136/7 136/8 136/10 136/16 136/17 136/18 136/19 140/2 141/23 142/5 142/6 142/9 143/1 143/7 143/11 147/23 148/6 149/20 150/11 150/12 150/13 155/21 158/25 161/5 161/13 161/24 162/9 178/21 180/14 181/8 181/23 184/3 184/4 184/20 185/18 186/17 187/4 187/8 188/2 188/9 188/25 189/9 190/21 190/25 191/2 200/21 204/21 205/10 205/15 205/15 206/1

hash [1] 117/23

hasn't [1] 88/19

hate [2] 45/9 135/10

have [355]

haven't [8] 25/12 73/12 81/17 81/20 102/17 160/10 172/18 203/14

having [25] 7/8 22/16 28/19 28/20 28/20 29/6 29/24 37/14 42/4 63/18 68/24 69/9 70/23 97/3 99/6 126/3 130/18 131/24 136/13 139/7 152/17 170/23 176/12 201/19 205/6

he [74] 6/6 12/6 22/14 28/5 28/5 37/1 37/2 37/4 37/8 38/7 38/16 38/18 38/23 38/24 39/20 44/22 45/4 45/6 65/20 65/21 78/9 78/16 78/17 78/17 78/20 79/16 80/5 89/9 89/10 97/17 104/12 104/13 105/2 105/5 105/7 105/8 110/2 111/21 113/4 113/7 113/8 113/8 121/18 121/20 122/3 125/15 125/21 131/6 133/19 140/2 140/18 140/18 140/18 140/19 148/6 148/6 148/10 149/20 150/12 164/2 164/2 164/3 183/14 183/17 191/21 200/7 203/11 204/19 205/10 205/15 205/15 205/24 205/24 206/1

he's [8] 5/9 78/14 78/20 113/6 148/11 148/17 149/4 179/1

head [3] 18/18 155/10 204/8

hear [2] 145/25 157/3

heard [5] 11/9 11/9 15/9 172/7 206/11

hearsay [17] 51/11 88/21 88/23 89/8 129/18 170/13 170/25 171/5 180/23 181/15 185/3 186/24 188/10 203/16 203/17 204/22 206/8

heart [1] 183/20

held [1] 208/10

Hello [1] 158/18

helped [2] 55/24 173/13

helpful [3] 12/9 45/11 96/9

helping [1] 204/5

her [21] 5/23 6/1 6/3 6/14 6/15 140/25 141/1 141/13 142/8 143/12 148/3 148/22 161/25 162/3 170/1 171/2 171/4 171/8 188/7 194/12 196/13

here [46] 5/9 6/25 17/10 18/23 25/1 25/11 27/11 34/3 37/11 42/8 44/15 44/21 48/16 56/13 67/5 68/16 70/21 93/7 108/15 112/24 114/15 136/1 138/23 140/23 141/2 147/11 147/20

<p>H</p> <p>here... [19] 147/24 148/7 159/22 168/13 170/8 179/20 181/3 181/5 182/25 190/12 194/7 196/3 196/6 200/19 201/6 201/25 203/6 204/24 207/10</p> <p>hereby [1] 208/8</p> <p>hereunto [1] 208/12</p> <p>HERNANDEZ [1] 3/8</p> <p>high [1] 103/19</p> <p>high-tech [1] 103/19</p> <p>highlighted [1] 100/13</p> <p>him [31] 5/10 22/14 38/21 39/20 78/12 78/16 79/4 88/23 89/12 97/18 104/10 104/16 113/4 121/15 121/17 121/23 122/1 122/2 124/10 128/15 128/16 140/4 147/10 148/8 176/1 176/2 196/7 196/12 196/13 201/7 203/22</p> <p>his [30] 5/9 22/16 28/4 35/15 78/10 78/18 78/22 79/16 80/9 96/23 97/12 101/5 109/13 109/14 109/18 110/9 124/5 128/13 128/18 137/10 148/15 149/2 149/19 150/5 192/10 196/6 196/12 204/19 204/20 205/14</p> <p>hold [3] 142/18 169/19 190/5</p> <p>home [1] 148/25</p> <p>honor [146] 5/5 6/5 11/20 11/22 21/3 22/19 23/23 35/15 36/19 36/24 37/19 38/16 40/4 45/2 45/12 51/1 51/9 51/11 53/11 53/17 61/18 62/7 63/10 65/13 65/18 65/23 78/7 78/9 79/6 79/10 79/15 79/22 80/6 80/8 82/11 82/16 82/24 83/11 83/16 84/4 86/11 88/20 89/1 89/5 89/13 90/24 96/25 97/7 101/4 101/6 102/10 103/24 104/1 104/23 105/15 105/21 106/9 107/18 107/22 108/10 111/1 111/2 111/8 112/24 113/9 113/19 124/1 124/5 124/8 128/10 129/8 129/17 129/24 130/6 130/11 130/17 133/17 133/20 134/13 134/15 135/3 139/19 139/20 140/22 141/5 144/19 146/19 147/23 149/5 150/4 151/10 152/4 161/15 170/1 170/12 170/25 171/1 173/2 173/20 173/25 175/3 175/8 175/11 175/25 178/23 180/1 180/22 181/14 184/2 184/18 185/1 185/7 185/8 186/1 186/23 187/17 189/14 190/10 191/7 191/8 191/22 192/4 192/12 192/22 193/13 194/18 194/21 196/9 196/18 196/20 197/4 197/6 197/11 198/2 198/9 198/15 199/2 199/14 199/24 200/6 200/8 200/9 203/10 203/18 204/16 206/4</p> <p>Honor's [5] 79/23 80/15 107/25 111/12 205/25</p> <p>HONORABLE [1] 1/11</p> <p>hope [3] 82/20 134/17 166/8</p> <p>hoping [1] 140/3</p> <p>horse [1] 135/10</p> <p>HORST [1] 2/9</p> <p>host [1] 135/15</p> <p>hour [1] 163/16</p> <p>hours [3] 54/15 156/6 170/9</p> <p>house [1] 74/16</p> <p>how [55] 6/14 13/2 14/13 18/15 18/20 23/17 31/8 32/1 37/12 46/8 48/13 49/12 56/20 59/25 61/7 62/9 64/14 68/16</p>	<p>73/13 77/17 77/20 80/2 80/3 82/25 106/16 106/17 108/18 109/22 110/3 110/12 112/22 113/14 119/8 120/12 121/15 121/17 121/20 122/1 123/5 124/18 124/19 137/24 138/2 140/11 153/18 155/6 161/9 176/23 177/20 178/2 178/14 190/1 190/2 190/2 190/8</p> <p>however [5] 1/7 6/2 14/9 149/24 197/5</p> <p>huh [2] 44/17 162/17</p> <p>human [14] 24/20 42/8 46/15 47/2 62/20 62/22 70/11 72/2 95/17 118/8 118/14 165/13 166/12 166/18</p> <p>hundreds [4] 125/9 125/12 136/11 138/5</p> <p>Hursti [3] 18/5 19/7 54/6</p> <p>husband [1] 156/5</p> <p>hypothetical [3] 109/15 110/4 110/7</p> <p>I</p> <p>I'd [1] 157/23</p> <p>I'll [17] 83/9 97/6 112/24 113/20 124/1 130/4 145/16 147/17 149/5 170/21 180/22 194/17 200/17 200/19 205/17 206/7 207/9</p> <p>I'm [142] 11/16 12/5 14/24 16/18 18/5 19/5 19/13 19/14 21/2 21/5 21/21 21/22 22/4 22/4 23/17 23/24 24/23 25/11 26/4 29/4 32/13 33/18 35/14 36/4 37/25 39/7 41/11 41/11 42/16 43/25 44/7 44/7 45/17 48/25 53/12 60/12 60/12 61/21 63/17 65/25 66/23 67/24 67/24 72/22 73/23 74/12 75/25 76/4 76/4 76/10 78/5 79/1 79/21 81/3 81/5 82/12 82/16 82/19 83/1 83/2 86/22 87/19 88/11 91/4 97/2 97/23 99/20 99/22 100/3 104/2 107/19 108/12 108/15 113/3 114/10 117/7 125/18 126/3 126/11 128/24 130/15 130/18 131/22 135/18 138/24 139/5 140/3 140/20 143/15 143/17 144/23 147/2 147/6 147/11 147/18 148/21 149/7 151/4 157/2 157/5 159/11 159/24 160/22 160/24 162/3 164/3 165/20 165/22 167/23 168/3 169/8 171/5 172/17 178/19 179/20 180/8 180/13 182/9 183/2 183/15 183/19 184/2 185/4 185/11 187/3 188/3 189/17 190/10 190/16 191/25 192/11 192/17 193/14 196/14 197/10 197/13 199/1 199/20 202/10 204/9 204/16 207/1</p> <p>I've [12] 14/7 17/22 17/25 19/3 31/25 32/3 32/3 68/17 126/6 153/25 160/11 194/21</p> <p>i.e [1] 22/8</p> <p>ICC [1] 120/16</p> <p>ICHTER [2] 2/20 2/21</p> <p>ICP [19] 33/10 73/10 73/13 80/18 80/20 80/21 81/2 81/4 81/17 81/22 82/1 82/5 82/6 102/15 102/17 102/20 102/21 102/23 102/24</p> <p>ICPs [2] 63/23 80/25</p> <p>ICX [24] 11/19 12/22 13/6 24/12 27/1 33/8 34/15 35/22 40/22 42/11 43/4 43/8 60/19 64/9 82/4 91/24 92/3 99/11 99/19 101/2 102/20 130/23 131/7 134/9</p> <p>ICXs [4] 15/7 15/24 17/5 26/18</p> <p>idea [7] 106/17 137/24 139/1 167/14 171/15 171/18 203/20</p> <p>ideas [1] 28/2</p>	<p>identification [1] 182/10</p> <p>identified [23] 11/15 13/1 13/3 15/7 78/3 80/24 81/2 81/4 85/5 85/7 88/4 106/2 109/22 113/16 115/25 116/1 116/3 121/9 187/23 188/3 193/1 202/8 205/16</p> <p>identifies [1] 76/5</p> <p>identify [13] 23/20 39/13 39/15 47/15 56/14 58/15 76/8 117/2 182/11 185/5 201/7 202/12 203/22</p> <p>ignore [2] 46/11 46/14</p> <p>iii [4] 2/13 2/16 2/18 108/22</p> <p>illegal [1] 92/4</p> <p>illustrate [1] 109/22</p> <p>illustrates [1] 110/18</p> <p>image [2] 86/12 87/3</p> <p>ImageCast [5] 20/2 20/4 22/6 117/1 117/10</p> <p>imaged [3] 10/8 10/12 86/13</p> <p>images [11] 18/1 23/7 25/21 63/15 63/17 63/23 81/23 85/15 85/20 86/5 86/8</p> <p>imagine [2] 138/7 147/16</p> <p>imaging [1] 10/19</p> <p>immediately [4] 25/1 30/2 38/1 119/22</p> <p>impact [3] 77/14 84/13 131/12</p> <p>impeaching [1] 78/11</p> <p>imperfect [1] 9/22</p> <p>implement [10] 9/8 16/5 76/18 106/1 106/16 106/18 113/15 121/9 121/15 122/1</p> <p>implementation [7] 59/24 60/4 114/23 116/7 116/13 116/22 119/19</p> <p>implemented [9] 48/25 59/4 60/2 116/24 117/14 117/21 118/18 121/21 194/4</p> <p>implementing [3] 60/5 60/7 130/23</p> <p>import [1] 74/8</p> <p>importance [2] 24/21 202/16</p> <p>important [18] 12/19 14/8 16/10 17/16 24/13 25/25 26/22 28/17 28/21 30/18 56/19 59/6 99/8 102/23 136/13 140/2 184/16 190/6</p> <p>impose [2] 71/10 71/12</p> <p>impossible [3] 27/23 75/3 146/13</p> <p>impracticable [1] 124/23</p> <p>impractical [1] 57/1</p> <p>impression [1] 46/19</p> <p>improper [2] 128/18 128/19</p> <p>improvement [5] 28/24 29/2 57/19 58/2 71/25</p> <p>inability [1] 24/1</p> <p>inappropriate [1] 17/12</p> <p>Inc [1] 109/5</p> <p>incident [1] 44/13</p> <p>include [6] 24/15 106/6 106/12 118/9 199/11 199/15</p> <p>included [10] 19/11 29/19 67/5 85/4 88/21 93/10 95/17 108/25 198/14 198/21</p> <p>includes [4] 90/6 91/8 137/17 137/20</p> <p>including [11] 59/5 60/25 68/25 93/12 116/12 120/21 122/11 128/2 135/6 136/7 137/14</p> <p>incomplete [1] 188/5</p> <p>inconsistent [1] 24/20</p> <p>inconsistently [1] 118/14</p> <p>incorrect [2] 97/13 165/18</p>
--	--	--

<p>I</p> <p>incorrectly [2] 82/2 142/7</p> <p>increase [1] 70/3</p> <p>increased [4] 48/19 48/20 120/12 121/6</p> <p>increases [1] 87/11</p> <p>indeed [1] 188/3</p> <p>independent [2] 8/16 137/12</p> <p>independently [1] 17/18</p> <p>indicate [9] 59/1 114/22 114/24 116/7 116/9 116/13 116/16 116/22 119/6</p> <p>indicated [2] 91/14 180/5</p> <p>indicates [2] 23/1 32/20</p> <p>indicating [1] 114/17</p> <p>indication [2] 13/5 120/2</p> <p>indications [1] 132/1</p> <p>individual [5] 20/1 47/13 61/11 68/19 70/9</p> <p>individually [1] 16/18</p> <p>individuals [2] 62/12 138/23</p> <p>infeasible [1] 104/18</p> <p>infinite [3] 61/1 61/3 61/8</p> <p>inflammatory [1] 38/25</p> <p>information [27] 10/23 18/4 36/22 42/21 43/3 44/11 44/21 44/24 68/25 89/21 89/23 105/10 118/4 120/14 137/13 138/21 139/2 139/14 147/16 149/16 172/16 172/18 179/17 187/8 187/11 188/11 195/12</p> <p>informed [2] 10/18 110/24</p> <p>infrastructure [1] 70/3</p> <p>infrequent [1] 24/24</p> <p>initially [1] 7/21</p> <p>initiating [1] 177/20</p> <p>injection [1] 65/21</p> <p>injuries [1] 158/9</p> <p>injury [1] 157/1</p> <p>input [1] 15/3</p> <p>inquiring [1] 108/2</p> <p>insecure [2] 8/6 122/9</p> <p>insert [1] 154/6</p> <p>inserting [1] 62/13</p> <p>insertion [2] 161/13 162/9</p> <p>inside [4] 35/2 35/4 60/21 167/21</p> <p>insider [6] 62/24 62/25 63/7 63/10 73/4 101/22</p> <p>insiders [4] 62/9 63/19 73/9 102/7</p> <p>inspected [2] 38/17 87/25</p> <p>inspecting [2] 81/14 87/22</p> <p>install [8] 72/6 73/10 82/1 82/7 88/13 109/10 109/24 117/10</p> <p>installation [8] 34/4 35/4 49/25 72/5 72/17 73/5 73/6 73/19</p> <p>installed [8] 15/15 26/18 34/17 35/21 36/5 64/2 88/2 108/18</p> <p>installing [7] 11/17 34/10 34/15 34/23 35/1 72/25 115/24</p> <p>instance [6] 23/7 29/15 66/9 67/12 94/1 191/14</p> <p>instances [1] 69/4</p> <p>instead [7] 28/15 66/16 68/18 69/8 75/20 75/23 153/21</p> <p>instruct [1] 66/17</p> <p>instructions [1] 121/2</p> <p>insufficient [1] 47/14</p> <p>insulting [1] 147/15</p> <p>integrate [1] 120/4</p>	<p>Intelligence [1] 135/22</p> <p>intend [1] 158/13</p> <p>intended [2] 99/7 184/3</p> <p>intent [9] 27/22 127/13 132/16 132/22 133/3 133/4 133/7 133/10 133/15</p> <p>intentions [1] 48/24</p> <p>interact [1] 86/10</p> <p>interacted [2] 85/22 86/7</p> <p>InterCivic [1] 92/18</p> <p>interest [1] 141/13</p> <p>interested [3] 8/8 160/12 179/20</p> <p>interesting [2] 27/24 29/13</p> <p>interface [3] 56/3 56/4 133/6</p> <p>interfaced [1] 137/15</p> <p>internal [2] 35/6 35/13</p> <p>internalize [1] 32/7</p> <p>internationally [1] 135/1</p> <p>internet [3] 22/8 22/11 105/1</p> <p>interrupt [2] 160/24 183/7</p> <p>intervention [5] 52/25 56/22 56/22 56/25 57/5</p> <p>interventions [4] 52/11 52/15 57/2 58/10</p> <p>introduce [3] 69/17 78/18 130/2</p> <p>introduced [1] 185/6</p> <p>introducing [1] 79/14</p> <p>intruders [1] 73/9</p> <p>intrusion [5] 24/5 74/9 74/25 86/17 87/11</p> <p>investigate [1] 177/11</p> <p>investigated [1] 184/17</p> <p>investigating [1] 177/3</p> <p>investigation [7] 177/20 177/25 178/4 178/5 178/10 181/12 186/16</p> <p>investigations [2] 135/8 177/7</p> <p>investigative [1] 195/11</p> <p>investigators [4] 177/25 178/3 178/11 187/15</p> <p>invisible [1] 71/21</p> <p>involve [5] 29/14 29/16 29/17 52/4 177/14</p> <p>involved [16] 31/17 32/14 35/17 40/9 40/20 44/4 44/22 52/2 52/5 71/3 95/16 103/7 146/5 168/6 200/15 200/21</p> <p>involves [7] 20/24 30/18 73/21 73/25 73/25 99/5 180/15</p> <p>involving [3] 32/4 179/22 181/8</p> <p>is [821]</p> <p>isn't [7] 47/24 77/1 83/4 149/2 161/20 167/6 170/8</p> <p>issue [35] 22/16 58/23 61/20 70/16 79/13 80/4 87/20 95/4 96/4 111/3 111/6 111/6 113/1 128/16 131/24 140/23 141/23 143/6 144/20 146/8 172/3 175/14 180/15 180/20 186/25 187/18 188/25 189/25 190/20 191/1 196/21 200/24 202/15 204/11 204/13</p> <p>issued [5] 36/9 50/1 50/8 54/18 135/13</p> <p>issues [18] 31/17 71/11 71/13 79/2 84/19 95/6 101/9 111/3 134/24 160/16 177/14 184/15 189/21 189/22 200/16 202/3 204/1 204/14</p> <p>issuing [1] 111/17</p> <p>it [586]</p> <p>items [8] 5/6 5/13 22/14 56/14 58/9 58/14 58/18 107/24</p> <p>its [13] 8/16 16/24 20/25 21/12 21/19 91/22 100/16 115/24 116/12 123/11</p>	<p>134/6 177/2 178/22</p> <p>itself [10] 15/18 34/18 35/17 36/5 78/13 88/2 110/20 145/5 178/16 186/19</p> <p>J</p> <p>J-A-N-I-C-E [1] 176/9</p> <p>J-O-H-N-S-T-O-N [1] 176/9</p> <p>JACOUTOT [1] 3/7</p> <p>jam [1] 156/22</p> <p>Jan [1] 5/20</p> <p>JANICE [4] 4/14 141/6 176/8 176/11</p> <p>JANUARY [10] 1/13 5/2 44/22 45/8 84/14 85/10 85/13 163/4 164/17 208/13</p> <p>January 2021 [4] 84/14 85/13 163/4 164/17</p> <p>JAVIER [1] 3/4</p> <p>Jeff [1] 121/12</p> <p>JEFFREY [2] 2/2 150/7</p> <p>Jersey [1] 157/23</p> <p>Jill [1] 94/15</p> <p>job [4] 187/5 195/15 195/18 195/19</p> <p>John's [1] 153/7</p> <p>JOHNSTON [24] 4/14 5/20 6/10 140/23 141/6 147/25 148/21 175/11 176/8 176/11 176/15 179/12 180/13 182/5 183/23 186/13 188/20 189/21 191/11 192/14 192/25 195/2 195/14 195/21</p> <p>Johnston's [1] 141/3</p> <p>join [2] 203/18 206/7</p> <p>joint [4] 125/16 125/18 125/19 125/21</p> <p>JOSH [1] 3/4</p> <p>JR [1] 3/9</p> <p>Juan [6] 27/24 124/5 150/22 151/15 198/4 199/25</p> <p>judge [26] 1/12 5/18 6/23 40/3 96/8 96/11 96/14 96/17 96/20 97/22 97/24 151/4 180/8 181/4 182/6 183/8 186/20 187/3 188/1 191/3 201/1 202/4 205/4 205/18 206/17 206/24</p> <p>judge's [2] 62/24 97/3</p> <p>July [11] 14/12 35/15 36/9 42/20 44/1 44/5 44/24 50/1 54/18 157/25 202/14</p> <p>July '21 [1] 54/18</p> <p>July 14 [1] 202/14</p> <p>July 1st [4] 14/12 35/15 44/1 44/5</p> <p>July 2021 [2] 36/9 42/20</p> <p>July 31st [1] 50/1</p> <p>jump [1] 25/1</p> <p>juncture [3] 187/25 188/5 194/12</p> <p>June [7] 25/7 25/10 163/10 163/11 163/23 164/12 169/13</p> <p>June 2020 [2] 163/10 163/11</p> <p>June 30th [2] 25/7 25/10</p> <p>jurisdiction [3] 31/8 94/1 178/16</p> <p>jurisdictions [18] 20/9 20/12 20/13 29/20 29/23 45/16 89/16 89/18 89/25 90/4 90/6 90/9 90/13 90/17 91/9 91/11 94/24 114/17</p> <p>just [157] 12/23 13/8 18/8 23/20 23/21 33/4 33/25 36/13 37/4 37/24 38/13 39/5 39/21 39/24 40/8 42/16 50/10 54/22 55/8 57/2 58/10 60/12 61/16 62/20 64/15 66/2 68/15 68/17 68/20 70/19 72/6 72/14 73/5 75/14 75/14 76/2 79/11 79/22 81/15 82/6 83/8 84/2 86/3 86/24 92/25 93/8 94/3 94/7 98/19 99/16 104/4 104/10 104/20 105/3 105/15 107/1 108/13 108/15 109/19 111/3 111/5</p>
--	---	--

J just... [96] 111/19 112/24 113/6 115/3 117/15 119/9 119/16 120/17 121/2 121/18 122/19 123/2 123/12 123/15 124/1 128/16 129/4 129/11 130/15 133/12 134/16 134/23 135/11 135/18 136/9 140/2 140/20 143/17 147/15 147/21 148/19 148/21 148/22 149/5 154/1 154/14 154/24 156/22 156/25 157/6 157/21 158/4 158/5 159/5 159/12 161/19 162/3 162/3 165/15 166/10 167/15 168/11 170/12 172/18 173/5 173/6 173/20 174/4 174/18 175/19 177/13 178/23 178/25 179/16 182/20 183/8 183/11 184/18 184/20 185/4 185/9 185/19 185/24 185/24 186/19 186/19 186/23 187/3 190/16 191/8 191/16 191/20 191/25 192/12 193/13 193/18 194/21 195/25 197/12 199/5 201/13 201/14 203/14 203/19 205/19 206/4	lack [7] 23/25 28/14 90/15 96/20 97/22 111/11 111/13 lacked [1] 25/25 ladies [2] 144/11 190/17 landscape [4] 134/24 136/2 136/10 137/3 language [2] 114/16 129/20 languages [1] 56/8 laptop [1] 11/1 large [9] 44/25 72/20 73/2 90/6 91/22 93/12 103/20 119/5 119/5 LAROSS [3] 3/7 4/12 158/18 last [23] 5/22 5/23 6/1 21/6 24/18 26/13 26/14 52/8 58/9 88/22 118/7 127/5 127/5 127/5 127/10 140/15 157/7 157/8 163/13 186/7 201/13 201/25 207/2 late [1] 82/22 later [8] 37/3 86/12 108/9 108/14 130/4 130/15 149/20 193/18 latter [1] 42/19 launching [1] 98/11 LAURA [2] 2/13 2/18 law [9] 2/15 2/17 2/24 109/2 143/10 146/10 160/2 197/12 197/25 Lawrence [1] 153/5 lawsuit [2] 18/6 189/16 lay [1] 12/8 layer [1] 9/11 layers [3] 9/20 9/20 9/22 layout [4] 18/8 18/25 112/17 114/4 layouts [2] 18/21 19/3 leads [2] 19/11 46/19 leaked [2] 44/3 70/2 leaks [1] 44/5 learn [1] 86/16 learned [5] 10/11 10/14 10/19 11/5 11/7 learning [2] 10/8 43/25 least [15] 6/13 7/21 19/4 53/5 70/10 71/22 73/18 80/9 137/13 139/21 146/12 149/2 162/25 198/12 206/15 leave [1] 12/17 legal [5] 112/25 113/4 178/24 179/9 192/1 legitimate [2] 99/3 205/14 leisure [1] 120/20 length [3] 113/23 134/21 205/10 Leon [2] 156/5 156/7 less [9] 8/6 63/20 71/2 74/9 74/10 82/5 136/16 150/22 174/19 let [26] 6/5 12/10 14/24 23/4 43/20 43/24 68/1 69/1 92/25 97/6 107/18 130/3 138/11 141/12 147/17 148/25 164/13 165/3 173/6 175/17 177/11 185/24 191/16 194/17 203/5 203/7 let's [13] 11/11 23/21 33/6 40/21 46/24 72/4 122/5 130/15 147/21 150/18 164/13 165/1 169/22 letter [4] 125/16 125/18 125/19 125/21 level [4] 13/11 106/18 151/25 184/15 lever [1] 157/24 libraries [4] 66/24 67/3 67/6 67/7 library [3] 156/5 156/12 156/12 life [1] 203/7 light [5] 10/13 44/11 44/16 135/7 139/17 like [56] 5/19 6/3 9/12 11/2 11/18 23/15 37/1 38/10 38/10 45/5 45/6 49/17 56/7	67/8 68/9 69/4 71/5 71/16 77/3 81/6 81/15 87/14 96/14 105/12 119/13 120/24 124/19 124/20 129/10 136/5 140/25 143/4 143/12 147/10 147/24 148/3 148/17 150/25 151/14 156/12 156/23 157/9 157/25 158/6 160/15 163/17 173/1 173/20 178/4 179/15 185/17 190/11 197/7 198/3 199/9 204/24 likelihood [1] 10/24 likely [11] 9/21 10/17 12/23 33/23 47/9 52/20 73/12 75/3 82/6 147/5 149/4 limitation [1] 93/6 limited [3] 80/20 108/2 203/13 limiting [16] 15/1 15/3 28/12 47/16 47/18 48/1 48/5 48/7 48/10 48/14 49/2 49/7 49/10 75/8 103/1 118/21 Lindell [3] 44/21 45/4 137/15 Lindell's [5] 44/8 45/23 137/9 137/17 138/19 line [13] 1/6 38/16 41/6 68/18 78/12 101/10 108/2 155/16 156/6 169/19 170/6 170/21 171/9 lines [7] 156/5 156/10 163/17 168/19 169/6 169/7 169/12 lineup [1] 156/13 liquor [1] 38/2 list [17] 5/21 6/7 6/7 6/9 12/12 13/12 20/21 22/22 57/5 57/11 58/18 141/8 154/14 154/15 176/25 198/21 199/4 listed [5] 5/21 24/25 94/1 109/17 118/12 listen [1] 145/17 listened [1] 11/8 lists [1] 91/7 literally [1] 37/4 literature [1] 55/1 litigation [2] 2/11 158/10 little [23] 11/11 14/22 27/14 33/6 46/24 53/12 70/20 72/4 112/5 144/19 145/11 146/3 147/19 149/1 150/17 156/14 165/20 169/18 169/21 174/20 179/15 185/11 197/22 LITTLEFIELD [1] 3/5 live [9] 89/25 90/3 90/12 90/17 91/12 109/12 151/21 159/6 175/19 lived [1] 159/14 LLC [1] 3/5 LLP [1] 2/7 loaded [6] 59/13 60/8 64/5 64/22 65/10 66/24 loading [1] 84/8 locate [2] 129/12 130/13 located [1] 17/2 location [2] 131/4 155/24 locations [4] 18/10 18/22 18/23 25/25 lodge [3] 181/18 189/14 192/5 lodged [1] 187/4 log [2] 139/13 156/22 logged [1] 177/22 logic [8] 13/24 14/2 14/5 14/8 14/10 14/13 46/23 117/24 logical [1] 151/18 logistical [1] 175/14 Logistically [1] 148/14 logs [2] 67/16 67/19 long [27] 15/1 23/17 51/24 70/5 86/14 97/20 106/16 106/17 121/17 140/5
K KAISER [1] 2/5 Kaspersky [1] 11/1 keep [7] 39/5 53/13 69/9 69/10 130/15 156/24 206/12 kept [1] 17/4 Kevin [2] 148/2 148/5 key [4] 24/17 69/18 69/24 69/25 keys [2] 117/18 117/19 kidding [1] 173/5 kids [1] 157/25 kind [19] 17/12 38/20 39/2 56/4 56/25 70/14 72/9 73/12 74/7 108/13 115/1 133/11 142/11 142/14 157/25 166/13 171/22 173/13 204/21 kinds [1] 74/7 KNAPP [1] 2/8 knew [1] 42/25 know [106] 5/7 6/6 6/19 6/20 6/21 9/14 10/20 10/21 12/2 12/3 17/24 18/15 18/20 26/12 27/24 28/4 30/12 38/9 38/10 43/22 44/9 45/5 48/13 48/22 48/23 49/5 53/11 56/20 57/22 58/3 58/6 69/16 70/2 70/5 70/16 70/20 71/3 74/3 74/14 74/18 74/20 75/4 97/17 108/15 118/20 118/23 134/20 138/5 138/9 138/21 138/24 139/3 139/4 139/5 139/6 141/13 143/20 144/6 145/11 147/9 147/14 148/22 154/14 156/12 156/13 156/16 156/19 157/23 158/2 158/2 160/12 161/16 164/4 165/8 165/9 165/20 165/21 165/23 166/3 166/4 166/15 167/24 168/15 170/6 170/10 170/22 171/19 172/15 182/15 183/18 184/4 184/7 187/8 187/24 188/15 189/8 190/21 190/22 190/25 192/7 196/5 197/1 199/22 203/11 203/15 205/4 knowledge [5] 84/16 121/20 137/12 137/12 141/19 known [3] 78/1 108/19 152/13 knows [2] 45/5 89/10 KREVOLIN [1] 2/9	lab [3] 16/14 17/2 17/5 laboratory [1] 120/17	

<p>L</p> <p>long... [17] 155/21 156/5 156/20 168/19 169/6 169/7 169/12 170/11 170/23 174/14 175/23 176/23 185/12 188/7 188/14 195/24 198/6</p> <p>longer [2] 163/9 169/18</p> <p>look [18] 8/15 8/19 17/24 52/7 52/16 54/22 54/24 59/10 68/20 81/15 86/23 126/19 140/25 185/24 193/18 202/7 205/16 206/23</p> <p>looked [4] 17/25 18/1 141/18 143/3</p> <p>looking [13] 12/4 18/9 21/5 22/22 38/9 100/7 126/12 130/15 136/21 161/19 173/3 185/4 199/1</p> <p>looks [4] 71/5 182/23 185/17 204/24</p> <p>Los [4] 93/1 93/4 93/15 94/7</p> <p>Los Angeles [4] 93/1 93/4 93/15 94/7</p> <p>lose [1] 122/14</p> <p>lost [2] 86/18 143/11</p> <p>lot [13] 30/16 30/18 32/5 37/23 48/15 48/18 48/19 86/15 136/17 149/8 155/22 179/16 198/18</p> <p>loud [1] 117/15</p> <p>louder [1] 146/3</p> <p>Louisiana [2] 91/15 91/17</p> <p>love [6] 157/21 158/1 158/3 158/4 158/5 160/12</p> <p>low [1] 98/10</p> <p>low-tech [1] 98/10</p> <p>lower [1] 182/12</p> <p>luck [1] 139/24</p> <p>lunch [1] 83/14</p>	<p>132/22 146/13</p> <p>making [3] 99/2 100/20 169/8</p> <p>malfunctioning [4] 131/13 131/25 132/7 168/15</p> <p>malicious [4] 17/17 35/1 59/20 123/10</p> <p>maliciously [1] 133/8</p> <p>malware [76] 14/4 14/7 14/19 14/21 15/15 15/17 15/18 17/4 17/8 26/17 26/20 34/4 34/10 34/15 34/17 34/18 34/24 35/21 35/22 35/25 36/3 36/5 36/6 36/8 36/10 36/11 36/14 36/16 38/6 39/9 39/11 40/10 40/12 50/11 54/17 59/5 59/9 60/9 60/9 60/14 60/15 60/17 64/2 64/4 64/9 64/13 64/16 64/22 65/3 65/10 66/3 66/3 66/4 66/5 66/17 66/22 72/6 72/25 73/10 82/1 82/7 84/8 85/17 85/18 86/4 88/1 88/2 95/24 108/18 109/10 109/24 110/3 120/24 161/14 162/10 171/25</p> <p>management [6] 20/2 22/7 69/15 73/21 73/23 117/18</p> <p>manipulated [2] 24/19 118/13</p> <p>manipulating [2] 72/10 73/25</p> <p>manipulation [8] 71/18 74/8 96/21 97/25 98/2 98/11 110/4 114/6</p> <p>manner [1] 55/22</p> <p>manufacturer [3] 24/3 91/25 92/15</p> <p>manufacturers [2] 28/6 28/7</p> <p>many [24] 18/15 18/20 19/4 20/8 20/12 20/13 26/6 48/13 49/12 59/18 77/3 77/3 85/7 91/24 120/1 121/20 122/11 123/5 136/11 137/24 138/2 140/11 153/25 155/6</p> <p>map [1] 91/8</p> <p>March [2] 176/24 195/6</p> <p>Margaret [3] 152/13 158/23 158/25</p> <p>margin [2] 77/24 78/1</p> <p>mark [2] 51/4 63/1</p> <p>marked [49] 16/11 29/7 29/11 29/25 30/5 30/6 30/8 46/6 46/15 55/13 56/15 63/1 63/2 63/5 74/4 74/5 74/23 74/24 75/5 75/14 80/22 80/25 81/8 81/13 81/18 81/19 81/21 82/2 93/25 97/9 101/16 102/1 102/24 103/17 123/22 127/24 128/7 132/15 132/18 132/20 132/21 132/23 133/10 133/15 153/24 167/6 167/18 168/3 182/9</p> <p>market [3] 27/3 27/16 28/2</p> <p>marking [12] 27/3 27/16 41/22 42/4 46/6 50/8 58/16 61/10 61/25 92/13 93/19 113/16</p> <p>Marks [3] 7/18 18/5 19/7</p> <p>Marks' [1] 11/8</p> <p>Martin [1] 19/20</p> <p>MARTINO [1] 2/6</p> <p>MARTINO-WEINHARDT [1] 2/6</p> <p>MARY [1] 2/5</p> <p>master [1] 199/4</p> <p>mastered [1] 121/19</p> <p>match [1] 96/1</p> <p>matching [1] 69/3</p> <p>material [1] 37/2</p> <p>materially [3] 43/7 87/11 121/5</p> <p>materials [2] 75/24 195/11</p> <p>math [1] 54/14</p> <p>matter [10] 5/18 64/14 79/4 145/3 146/4 146/9 166/11 187/19 188/20 208/11</p>	<p>matters [4] 113/22 141/18 195/14 196/20</p> <p>MATTHAEUS [1] 2/6</p> <p>MAX [3] 100/5 100/9 100/12</p> <p>may [33] 1/2 1/4 6/7 12/8 28/1 28/5 28/7 37/8 38/8 51/1 65/23 82/7 83/15 90/24 96/25 123/3 141/7 149/15 155/3 165/3 173/2 175/5 178/23 179/14 182/6 185/15 189/6 190/8 190/15 195/8 202/4 203/12 206/21</p> <p>maybe [8] 22/19 36/4 71/2 77/2 138/6 177/21 196/15 204/25</p> <p>McGUIRE [2] 2/16 2/17</p> <p>MD [1] 176/11</p> <p>me [83] 5/9 6/2 12/10 14/24 16/17 18/1 19/8 19/11 19/17 23/1 23/4 23/11 24/14 25/18 37/2 37/24 39/18 40/14 43/17 43/20 43/24 47/3 51/17 54/16 68/1 69/1 73/13 78/15 81/6 81/7 86/11 88/18 89/6 92/25 96/6 96/7 96/23 107/18 112/15 116/20 124/5 125/8 125/11 126/10 126/10 127/6 129/2 129/23 130/3 130/12 130/15 138/11 141/2 142/25 146/1 147/19 149/10 149/11 154/25 155/22 156/23 157/11 157/22 158/25 164/2 164/13 165/3 166/11 167/24 173/6 177/11 179/25 180/2 182/13 182/20 183/9 185/24 191/16 191/17 197/7 203/5 203/7 206/22</p> <p>mean [61] 12/4 12/7 12/8 13/17 18/22 22/17 26/22 27/1 31/7 34/6 34/6 37/22 41/4 41/18 44/14 48/11 56/22 57/11 57/13 57/24 64/11 65/14 77/19 79/12 79/14 80/1 89/10 98/23 99/4 99/16 103/13 103/13 106/8 111/16 119/17 119/18 125/9 139/2 142/21 143/18 147/15 147/15 148/17 149/7 151/17 161/23 164/12 167/5 167/19 167/23 170/1 174/24 175/15 178/18 188/8 191/23 194/12 194/16 199/5 204/17 206/7</p> <p>meaning [2] 52/15 59/2</p> <p>means [6] 20/19 54/23 65/21 98/23 98/25 99/2</p> <p>meant [2] 109/22 142/7</p> <p>meanwhile [2] 136/10 144/7</p> <p>measure [1] 33/1</p> <p>measurement [1] 77/13</p> <p>measures [11] 9/8 15/22 24/10 114/18 114/23 115/8 193/1 193/12 193/21 194/4 194/8</p> <p>measuring [1] 33/2</p> <p>MECHANICAL [1] 1/21</p> <p>mechanism [1] 66/14</p> <p>mechanisms [2] 118/3 118/3</p> <p>media [3] 18/12 19/6 117/9</p> <p>meet [3] 158/21 158/22 200/20</p> <p>meeting [4] 173/24 178/7 178/9 202/14</p> <p>meets [1] 41/23</p> <p>MEGAN [10] 2/13 2/18 4/10 150/20 150/23 151/3 152/4 152/12 152/16 158/23</p> <p>member [6] 6/11 141/6 152/24 153/2 176/20 178/20</p> <p>members [2] 6/13 88/23</p> <p>memory [21] 15/19 143/1 143/5 143/9 143/13 143/23 146/9 146/15 146/15 146/18 146/20 147/9 180/7 188/22</p>
<p>M</p> <p>M-A-R-G-A-R-E-T [1] 152/14</p> <p>M-I-S-S-E-T-T [1] 152/13</p> <p>ma'am [1] 194/9</p> <p>machine [17] 13/9 25/24 62/6 73/5 84/8 95/17 102/9 108/19 109/10 109/24 119/9 119/15 119/16 120/25 166/15 167/16 202/22</p> <p>machines [9] 95/1 95/9 95/20 95/25 96/4 101/13 107/5 119/14 123/7</p> <p>made [16] 18/9 23/1 39/20 45/20 45/22 45/25 100/12 111/5 136/2 137/16 138/1 145/23 168/2 169/3 178/13 179/3</p> <p>magnifying [2] 172/9 173/4</p> <p>magnitude [1] 73/14</p> <p>mail [16] 90/7 91/12 93/4 93/13 93/14 93/18 94/8 94/11 102/5 142/17 142/20 142/23 142/24 153/23 157/17 163/24</p> <p>mail-in [7] 90/7 93/4 102/5 142/17 142/20 142/23 142/24</p> <p>maintain [1] 107/3</p> <p>maintains [1] 89/22</p> <p>major [5] 28/6 28/6 49/11 93/21 172/4</p> <p>make [44] 12/22 16/16 39/4 45/9 50/12 52/20 56/18 57/17 59/11 60/24 65/1 65/2 68/13 68/14 71/21 73/6 82/1 87/17 98/15 100/21 105/16 111/4 111/17 121/2 122/14 132/17 132/19 132/24 133/13 155/25 159/5 161/19 166/21 172/23 178/17 178/21 179/2 183/8 184/20 184/21 188/5 203/5 203/7 206/12</p> <p>maker [1] 30/17</p> <p>makes [6] 28/21 67/8 73/2 87/17</p>		

<p>M</p> <p>memory... [7] 188/25 189/4 189/7 189/10 189/21 189/25 190/5</p> <p>mention [2] 5/19 37/17</p> <p>mentioned [10] 25/15 26/13 60/8 121/7 158/23 159/2 159/17 162/16 172/12 195/4</p> <p>merely [6] 12/21 13/6 13/19 21/25 110/11 110/18</p> <p>Mesa [1] 45/24</p> <p>message [3] 69/18 69/22 70/1</p> <p>met [2] 47/23 158/19</p> <p>method [25] 31/3 31/4 31/6 49/24 50/2 65/20 72/6 73/19 87/15 89/19 90/1 90/4 90/10 90/13 90/14 90/18 91/10 91/20 92/2 110/12 133/13 178/21 179/11 180/9 190/1</p> <p>methodology [2] 93/7 110/8</p> <p>metrics [1] 13/15</p> <p>Michael [1] 186/8</p> <p>Michigan [22] 10/18 10/20 10/21 11/3 16/20 17/2 30/13 30/14 45/24 49/2 49/5 49/7 49/9 49/14 77/4 88/10 112/7 137/21 138/12 138/15 138/17 138/19</p> <p>Microsoft [1] 29/20</p> <p>middle [2] 97/11 122/22</p> <p>midterms [3] 155/1 155/5 160/23</p> <p>midway [1] 128/6</p> <p>might [15] 30/1 46/20 59/18 66/2 122/12 123/9 126/4 132/4 132/22 133/3 135/21 154/1 162/13 169/10 174/25</p> <p>Mike [2] 44/8 45/23</p> <p>Miller [2] 4/18 197/9</p> <p>millions [3] 119/14 125/7 136/11</p> <p>mind [3] 8/20 25/1 189/5</p> <p>mindful [1] 151/2</p> <p>minute [6] 142/20 144/15 151/23 174/19 182/20 200/17</p> <p>minutes [23] 6/4 26/16 53/16 53/19 82/19 82/22 82/22 83/1 83/8 140/11 140/12 141/14 144/9 147/13 150/22 156/23 157/11 174/15 197/24 198/6 200/21 202/13 206/14</p> <p>mismatch [7] 142/7 142/14 145/4 145/7 146/5 180/16 181/9</p> <p>missed [5] 120/22 160/17 160/18 160/22 174/22</p> <p>MISSETT [19] 2/13 2/19 4/10 148/2 150/20 150/23 151/3 151/12 152/5 152/12 152/16 152/20 154/4 157/14 158/8 158/18 158/24 173/9 173/24</p> <p>missing [4] 88/8 88/12 115/5 116/6</p> <p>Mississippi [1] 153/11</p> <p>misspeak [2] 43/17 43/18</p> <p>misspoke [1] 174/3</p> <p>misstate [1] 170/1</p> <p>mistake [3] 132/22 132/24 168/2</p> <p>mistaken [1] 6/7</p> <p>mistakes [3] 132/17 132/19 133/13</p> <p>mitigate [1] 75/18</p> <p>mitigation [22] 20/22 21/24 114/17 114/23 115/8 115/10 115/15 115/21 116/8 116/14 116/18 116/23 116/25 117/15 117/17 118/5 118/7 118/11 193/1 193/21 194/4 194/8</p> <p>mitigations [8] 20/8 20/13 20/20 22/22 24/25 117/8 118/21 193/24</p>	<p>MITRE [7] 79/8 83/18 83/23 104/6 104/8 105/5 105/11</p> <p>MITRE's [1] 78/6</p> <p>mixed [1] 123/14</p> <p>mock [2] 40/16 52/2</p> <p>mode [4] 58/24 63/19 74/2 157/16</p> <p>model [7] 17/9 83/23 104/8 107/8 107/9 107/13 107/15</p> <p>modern [1] 102/5</p> <p>modes [2] 28/21 60/6</p> <p>modification [1] 102/25</p> <p>modified [6] 40/17 67/10 101/17 101/22 103/10 103/12</p> <p>modify [3] 20/3 103/17 103/21</p> <p>modifying [2] 35/17 102/7</p> <p>moment [3] 12/10 82/12 105/15</p> <p>Moncla [1] 183/2</p> <p>Monday [10] 147/19 148/15 149/6 149/21 149/25 150/3 196/22 200/13 200/23 205/17</p> <p>monitor [1] 140/18</p> <p>monitored [1] 61/5</p> <p>Montgomery [1] 19/21</p> <p>month [1] 186/7</p> <p>months [4] 54/11 123/9 146/11 146/12</p> <p>more [71] 6/18 8/3 8/6 9/10 9/21 11/11 11/13 11/16 14/17 26/25 28/22 38/8 39/21 43/24 44/24 46/24 48/22 48/23 50/12 52/17 56/2 56/6 58/10 58/13 58/23 58/23 59/3 63/22 64/13 64/19 65/3 68/15 68/19 68/22 71/1 71/10 71/12 72/4 82/4 82/17 82/25 83/2 96/14 98/10 105/22 107/18 135/4 136/16 138/6 147/19 149/4 149/8 149/16 155/25 156/8 158/15 160/15 175/3 183/19 184/12 185/15 186/11 187/8 187/24 188/11 189/17 190/24 192/17 192/18 196/15 206/15</p> <p>morning [5] 5/5 5/9 7/12 7/13 149/22</p> <p>MORRISON [1] 2/7</p> <p>Morsell [1] 109/5</p> <p>most [20] 8/7 17/16 22/25 23/9 23/15 23/21 25/1 29/7 29/9 29/11 49/14 49/14 77/1 85/7 89/22 112/6 120/21 121/18 147/5 156/12</p> <p>motion [1] 205/24</p> <p>motivated [2] 122/12 137/6</p> <p>motivation [1] 55/20</p> <p>move [11] 7/22 51/9 80/6 88/22 129/11 129/13 129/16 148/19 153/12 190/16 201/8</p> <p>moved [4] 159/15 159/20 160/8 184/19</p> <p>moving [5] 39/25 91/4 94/14 130/15 191/25</p> <p>Mr [10] 4/6 4/7 4/8 4/11 4/13 4/16 4/17 4/18 4/21 89/6</p> <p>Mr. [67] 5/8 5/14 6/5 6/17 11/8 19/7 19/20 19/21 22/25 24/6 27/6 41/3 44/21 45/4 50/23 54/6 70/5 85/2 89/2 89/7 103/4 104/4 104/6 108/4 114/11 119/2 125/14 126/7 127/23 129/22 130/24 131/2 131/7 134/22 137/9 137/15 139/16 148/25 149/6 149/21 150/10 150/12 150/15 175/25 181/16 182/21 183/2 183/3 183/7 184/1 187/9 187/14 191/14 191/19 192/2 192/5 192/6 196/22 197/9 197/23 200/25 201/11 201/14 201/23 202/7 205/21 207/10</p>	<p>Mr. Barnes [3] 24/6 187/9 187/14</p> <p>Mr. Belinfante [1] 5/8</p> <p>Mr. Bernhard [1] 50/23</p> <p>Mr. Brown's [1] 191/14</p> <p>Mr. Cross [3] 5/14 183/3 184/1</p> <p>Mr. Davis [6] 191/19 192/2 201/11 201/14 201/23 202/7</p> <p>Mr. Davis' [2] 192/5 192/6</p> <p>Mr. Hall [1] 11/8</p> <p>Mr. Hursti [2] 19/7 54/6</p> <p>Mr. Lindell [3] 44/21 45/4 137/15</p> <p>Mr. Lindell's [1] 137/9</p> <p>Mr. Martin [1] 19/20</p> <p>Mr. Miller [1] 197/9</p> <p>Mr. Moncla [1] 183/2</p> <p>Mr. Montgomery [1] 19/21</p> <p>Mr. Oles [8] 6/5 6/17 175/25 181/16 182/21 183/7 200/25 205/21</p> <p>Mr. Persinger [2] 197/23 207/10</p> <p>Mr. Persinger's [1] 108/4</p> <p>Mr. Schoenberg [6] 130/24 131/2 131/7 150/10 150/12 150/15</p> <p>Mr. Skoglund [4] 148/25 149/6 149/21 196/22</p> <p>Mr. Skoglund's [1] 139/16</p> <p>Mr. Tyson [16] 22/25 27/6 41/3 70/5 85/2 89/2 89/7 103/4 104/4 104/6 114/11 125/14 126/7 127/23 129/22 134/22</p> <p>Mr. Tyson's [1] 119/2</p> <p>Ms [2] 4/12 148/25</p> <p>Ms. [20] 6/10 7/18 11/8 18/5 19/7 94/18 94/19 94/23 140/23 141/3 141/6 148/2 148/21 175/11 179/12 180/13 182/5 183/23 188/20 189/21</p> <p>Ms. Janice [1] 141/6</p> <p>Ms. Johnston [10] 6/10 140/23 148/21 175/11 179/12 180/13 182/5 183/23 188/20 189/21</p> <p>Ms. Johnston's [1] 141/3</p> <p>Ms. Marks [3] 7/18 18/5 19/7</p> <p>Ms. Marks' [1] 11/8</p> <p>Ms. Missett [1] 148/2</p> <p>Ms. Stein [3] 94/18 94/19 94/23</p> <p>much [24] 9/21 28/22 33/24 64/19 70/19 82/5 82/25 83/2 97/6 122/18 135/6 136/6 136/6 136/23 147/10 156/25 157/10 158/15 160/7 175/4 175/6 186/11 190/23 195/24</p> <p>multipage [1] 185/18</p> <p>multiple [15] 9/1 56/7 60/10 61/12 61/21 62/14 62/25 63/1 64/9 64/11 92/5 106/25 121/1 126/4 133/18</p> <p>multiply [2] 54/16 125/11</p> <p>multitasking [1] 130/18</p> <p>must [2] 93/16 123/3</p> <p>my [109] 10/20 12/7 12/22 13/14 13/14 13/19 17/13 18/18 19/4 26/4 27/8 27/14 27/15 30/10 31/18 31/18 31/20 32/12 32/13 32/17 32/20 35/3 36/2 36/6 36/15 36/24 36/25 37/15 38/4 38/15 44/9 48/3 50/25 51/17 52/1 58/3 61/25 66/11 68/4 77/23 77/23 81/2 81/4 83/3 84/17 84/17 86/19 90/15 91/5 92/12 96/6 96/7 100/10 102/11 103/25 105/16 106/14 107/23 111/5 129/20 130/19 132/21 132/25 133/14 134/23 135/23 139/15 139/18 141/12 143/19 152/12 152/13</p>
--	--	---

M my... [37] 154/12 156/3 156/5 156/22 157/12 157/22 157/24 157/25 158/3 158/6 158/18 158/25 159/9 164/20 167/5 167/25 170/18 173/21 174/3 174/18 175/2 176/8 176/15 183/23 195/19 197/10 197/12 197/24 197/24 197/25 199/17 200/18 201/3 201/7 205/4 205/8 208/12 myself [1] 145/10	ninth [2] 117/17 118/5 no [133] 7/17 7/19 8/4 8/18 13/14 14/2 15/5 15/22 16/2 16/6 17/9 17/22 22/4 26/17 26/17 26/19 27/2 27/15 29/4 33/1 33/2 35/24 36/13 41/22 44/13 47/7 48/3 49/4 51/12 52/5 53/10 54/2 54/7 59/24 60/13 60/17 64/25 67/20 68/4 70/16 70/23 71/12 71/20 74/20 75/22 79/24 81/20 85/14 85/18 86/4 87/17 89/18 92/11 94/11 95/12 97/24 98/2 99/12 99/13 100/17 102/3 104/16 107/5 112/4 115/9 115/22 116/2 116/4 117/16 117/22 118/2 118/6 122/10 122/10 123/1 126/16 127/19 128/21 134/8 134/14 138/2 139/5 140/2 142/19 142/21 143/16 143/16 146/20 149/14 154/15 154/15 154/24 154/24 155/13 155/13 155/22 158/15 158/25 159/24 160/4 160/6 160/9 161/16 162/3 162/11 162/18 163/9 164/8 164/8 164/8 166/12 166/16 167/2 167/5 169/8 170/6 171/24 172/1 172/11 172/15 172/23 175/3 182/15 192/21 193/8 193/8 194/5 194/11 203/19 203/20 204/17 204/22 205/7 nods [1] 155/10 non [2] 39/21 104/19 non-descript [1] 39/21 non-scalable [1] 104/19 none [3] 106/18 144/5 145/14 nonspecific [1] 39/6 nontechnical [2] 121/3 121/7 normal [4] 62/20 121/3 121/7 130/22 normally [1] 122/3 NORTHERN [3] 1/1 208/4 208/7 NortonLifeLock [1] 109/5 not [299] note [6] 109/4 178/25 191/8 193/13 197/12 206/4 notebook [1] 19/16 noted [5] 111/16 111/17 113/20 170/14 191/2 notes [3] 105/16 118/11 127/11 nothing [7] 48/12 80/10 100/8 104/24 105/12 191/4 204/21 notice [3] 61/11 188/13 203/19 noticing [1] 72/10 notify [1] 37/2 notion [2] 54/25 55/6 notwithstanding [1] 55/12 November [1] 163/1 November 2020 [1] 163/1 now [39] 10/1 26/22 29/21 39/3 41/23 51/21 69/8 74/16 85/15 103/3 108/14 111/2 128/21 135/5 136/14 137/3 139/22 141/7 144/14 144/14 145/14 150/11 151/17 157/14 157/14 174/5 176/20 177/18 179/12 179/20 182/19 184/3 187/1 191/13 193/17 196/17 198/21 198/25 199/10 number [36] 1/5 1/6 1/5 18/18 48/15 50/25 62/11 62/12 62/16 62/16 68/5 72/16 74/12 77/18 77/21 87/19 90/2 90/3 90/11 91/7 119/5 127/23 141/23 154/25 177/23 179/13 179/15 179/19 180/15 182/19 184/16 188/14 189/9 198/7 204/1 204/14 Number 2023-025 [1] 141/23	numbers [2] 21/6 93/18 O oath [5] 7/3 194/3 195/19 201/15 201/23 OB [2] 196/1 196/2 OB-GYN [2] 196/1 196/2 object [11] 6/6 112/24 124/2 129/18 170/12 170/24 171/4 180/22 181/14 203/17 204/16 objected [2] 108/20 205/6 objection [23] 11/20 51/12 78/7 79/10 101/4 104/10 104/16 104/21 108/5 110/24 111/11 111/13 113/19 178/25 181/19 186/24 189/15 190/10 191/9 191/15 192/5 203/18 206/7 objections [7] 108/12 129/15 184/21 198/17 199/3 205/17 206/11 obligation [1] 192/1 observation [1] 77/10 observe [1] 155/15 observed [1] 53/8 observers [1] 17/24 obtain [2] 53/24 107/4 obtained [1] 54/2 obtaining [1] 153/25 obvious [1] 81/13 obviously [8] 83/3 146/13 150/5 153/23 161/24 161/25 192/10 192/16 occurred [2] 44/18 72/9 occurrence [1] 62/20 occurs [1] 47/11 off [7] 62/25 147/12 147/18 155/14 184/20 200/22 201/13 offer [11] 32/24 43/8 55/13 56/2 76/1 104/22 108/4 151/14 152/2 198/10 198/11 offered [8] 95/20 108/17 124/3 136/8 201/5 205/8 205/13 206/19 offering [15] 19/5 19/14 29/4 31/23 32/13 41/11 41/11 74/12 78/11 87/19 99/20 99/22 134/9 134/11 202/1 offers [1] 30/3 office [4] 2/24 54/5 59/10 65/4 offices [1] 73/16 official [8] 1/1 1/2 1/3 1/7 1/23 179/10 208/6 208/17 officials [5] 67/21 115/6 169/4 169/15 177/10 offline [1] 16/25 often [5] 33/3 67/4 72/13 107/1 107/1 oh [13] 21/5 48/15 123/2 123/17 128/24 140/16 144/23 157/5 157/19 159/11 160/10 160/22 182/15 okay [80] 34/10 39/16 39/23 54/8 56/6 66/20 74/13 76/17 77/17 79/25 82/12 83/6 85/19 94/5 108/7 112/5 115/10 117/7 123/3 124/12 125/14 128/5 134/16 139/17 142/23 146/17 149/13 150/18 155/4 160/7 160/18 161/4 163/1 164/9 164/23 165/1 165/24 166/5 169/6 169/17 172/2 172/9 173/3 173/6 175/21 177/9 177/11 177/17 178/1 178/8 179/12 179/20 180/2 180/8 181/11 182/25 183/4 183/5 185/17 185/22 186/16 189/5 189/13 190/23 194/15 197/14 197/21 200/2 200/15 202/9 202/11 202/13 202/15 202/24 203/1
---	--	--

<p>O</p> <p>okay... [5] 203/5 204/3 205/15 205/17 206/20</p> <p>old [1] 52/1</p> <p>OLES [13] 2/23 2/24 4/16 4/21 6/5 6/17 175/25 176/15 181/16 182/21 183/7 200/25 205/21</p> <p>ominous [1] 140/1</p> <p>once [12] 27/6 49/15 50/18 57/12 59/19 75/20 102/22 123/13 155/13 167/13 177/22 178/4</p> <p>one [102] 5/18 9/3 12/15 20/24 30/6 30/19 31/5 35/8 38/2 38/22 40/23 49/4 49/17 50/2 50/4 50/13 51/15 54/5 55/21 56/4 57/7 58/9 59/3 59/15 60/3 61/11 61/16 61/23 64/13 69/10 75/18 80/4 83/16 84/25 85/4 87/20 92/23 104/5 107/18 111/9 111/19 116/14 117/9 119/2 119/22 119/25 122/7 123/1 123/12 124/18 126/10 128/5 130/7 130/9 130/12 131/5 131/25 132/6 132/9 134/16 139/14 142/5 142/18 142/21 144/14 146/12 147/3 147/8 148/3 148/22 149/3 149/17 150/4 151/5 154/12 154/16 154/16 155/8 156/2 158/25 166/9 168/21 170/8 172/4 173/14 173/16 174/3 174/25 174/25 175/2 176/16 179/7 181/3 184/12 188/4 188/20 197/2 198/5 199/5 199/21 202/20 205/19</p> <p>ones [15] 23/21 25/1 26/5 38/13 40/10 42/18 50/19 71/22 76/15 81/3 85/8 92/15 120/22 120/22 146/19</p> <p>online [1] 177/21</p> <p>only [49] 1/2 1/6 15/19 29/5 29/8 29/24 31/16 34/18 35/22 47/1 47/17 48/1 49/13 52/11 54/4 57/15 58/8 59/11 59/15 59/24 60/4 62/5 68/11 68/12 71/22 74/22 92/9 93/8 103/6 117/9 119/25 127/11 135/7 138/16 146/18 153/23 166/13 166/14 182/1 182/2 185/8 185/13 188/6 192/18 197/10 204/21 205/13 205/21 207/2</p> <p>open [1] 200/1</p> <p>opened [1] 128/18</p> <p>operate [1] 30/25</p> <p>operating [4] 66/24 84/21 84/22 119/10</p> <p>operation [1] 177/14</p> <p>operational [2] 116/12 171/17</p> <p>operationally [1] 104/18</p> <p>opined [1] 87/10</p> <p>opinion [29] 14/2 14/23 14/25 15/5 21/23 26/18 29/24 32/10 41/8 43/3 49/20 95/20 97/20 98/22 99/20 99/22 106/12 108/23 110/19 114/22 119/1 122/8 128/11 128/18 128/20 134/9 134/11 170/5 196/13</p> <p>opinions [17] 14/18 31/23 32/2 35/23 36/1 36/12 53/1 76/1 96/22 97/14 107/7 110/8 112/22 113/15 124/2 128/13 168/8</p> <p>opportunities [1] 61/2</p> <p>opportunity [9] 39/20 61/11 70/10 71/23 85/24 155/15 201/5 205/7 205/25</p> <p>opposed [4] 8/6 48/10 62/5 149/8</p> <p>opposing [2] 104/24 128/17</p>	<p>optical [4] 63/12 63/14 101/18 102/6</p> <p>option [1] 29/6</p> <p>oranges [1] 102/4</p> <p>order [22] 11/23 18/18 53/25 54/2 54/3 65/18 75/17 81/23 84/20 84/22 108/7 108/13 111/8 111/14 111/15 112/15 140/7 157/11 191/10 205/1 205/3 205/22</p> <p>ordinary [2] 121/23 122/2</p> <p>organization [6] 161/24 202/2 204/9 204/18 205/9 205/14</p> <p>organization's [1] 204/10</p> <p>organizational [1] 206/9</p> <p>original [2] 39/8 107/4</p> <p>originally [1] 36/16</p> <p>other [75] 7/22 8/11 9/22 12/24 14/9 15/17 17/17 24/10 29/10 30/3 31/18 31/24 32/16 32/19 32/20 33/13 35/25 38/3 43/14 46/23 53/9 54/4 56/12 60/5 60/6 62/1 63/21 67/4 68/23 69/20 74/6 75/1 82/7 85/16 85/21 86/6 86/9 86/18 87/14 92/21 93/21 93/23 98/15 98/20 108/11 111/3 119/8 122/22 123/3 123/15 123/18 125/22 129/25 133/23 137/20 138/15 147/4 148/23 150/4 155/15 157/10 161/17 161/20 172/4 179/7 183/1 183/13 184/7 185/5 187/11 188/20 196/15 200/15 201/4 206/9</p> <p>others [6] 18/5 54/3 69/11 70/23 114/3 135/6</p> <p>otherwise [6] 71/21 78/18 108/11 190/14 200/22 203/16</p> <p>our [18] 6/7 6/12 10/5 36/24 64/15 73/4 94/14 104/21 108/5 140/15 149/17 150/11 150/16 173/2 178/17 200/5 200/12 200/13</p> <p>out [47] 8/23 15/14 44/23 44/24 44/25 46/8 57/12 57/23 58/4 62/19 69/14 69/19 70/2 76/13 76/16 81/15 82/21 86/1 99/18 99/21 100/13 100/14 100/17 117/15 121/3 129/5 132/18 144/7 148/3 154/5 156/7 156/21 156/24 161/20 163/19 165/5 165/12 166/16 170/7 170/11 193/1 197/11 197/13 199/22 200/19 202/17 203/19</p> <p>outcome [12] 41/21 47/8 47/14 47/22 75/7 77/14 77/22 95/7 98/24 99/3 189/8 190/22</p> <p>outcomes [1] 8/16</p> <p>outlined [5] 13/19 109/11 109/14 110/16 136/2</p> <p>outside [8] 45/18 54/5 67/6 84/19 92/8 92/10 135/20 156/15</p> <p>over [13] 14/24 37/15 56/14 63/20 71/25 86/1 136/14 149/6 154/5 158/19 165/3 174/19 177/24</p> <p>overall [2] 13/20 16/8</p> <p>overcounts [1] 90/5</p> <p>overly [2] 40/19 110/1</p> <p>overpowered [1] 197/15</p> <p>overreaching [1] 194/11</p> <p>overt [1] 123/13</p> <p>own [7] 16/14 17/14 72/14 72/24 99/2 170/5 202/2</p>	<p>21/6 52/8 55/11 97/10 97/20 109/7 115/11 126/8 126/13 126/20 127/4 167/5 183/1 184/4 184/6 184/9 185/2 185/4 185/9 185/12 185/12 185/14 185/16 185/19 185/22 185/25 188/4 188/6 188/6</p> <p>Page 16 [1] 97/10</p> <p>Page 3 [2] 21/4 115/11</p> <p>Page 6 [1] 109/7</p> <p>Page 80 [3] 126/8 126/13 126/20</p> <p>pages [6] 109/5 182/24 184/8 185/5 188/14 208/9</p> <p>Pages 4 [1] 109/5</p> <p>paper [44] 29/7 29/11 29/25 30/5 30/6 30/8 42/5 46/6 46/15 52/19 55/14 56/13 56/15 63/1 63/2 63/11 74/4 74/5 74/23 75/5 75/14 80/22 81/8 81/13 81/21 82/2 98/20 101/16 101/20 102/1 118/9 118/14 123/22 127/24 128/7 132/15 132/18 133/10 133/16 153/24 167/6 167/18 168/3 177/21</p> <p>paperwork [1] 159/1</p> <p>parachute [1] 9/12</p> <p>paragraph [9] 19/25 20/8 52/8 55/12 97/11 127/5 127/6 127/7 127/10</p> <p>paragraphs [1] 56/21</p> <p>Pardon [2] 67/17 135/14</p> <p>parents [1] 157/22</p> <p>park [1] 156/13</p> <p>parsing [1] 60/12</p> <p>part [28] 9/23 26/10 43/9 48/3 58/17 66/4 66/24 76/18 77/7 77/10 77/15 91/13 99/8 108/5 116/19 116/20 167/23 168/3 169/23 170/3 170/4 176/25 177/2 177/13 189/25 192/2 192/6 192/7</p> <p>partial [1] 1/8</p> <p>partially [1] 181/21</p> <p>participants [3] 52/12 57/4 138/4</p> <p>participated [3] 162/1 204/3 204/5</p> <p>particular [27] 9/4 17/24 41/16 50/9 52/25 59/2 59/15 59/22 64/4 65/1 66/17 66/18 66/25 67/5 76/2 77/24 79/13 80/3 108/24 108/25 109/3 109/4 111/3 135/1 163/23 180/3 180/3</p> <p>particularly [3] 36/22 107/1 179/20</p> <p>parties [5] 6/1 11/6 45/18 69/24 109/2</p> <p>parts [2] 114/2 198/13</p> <p>party [6] 59/10 65/4 66/18 94/19 94/20 154/18</p> <p>party's [2] 154/16 199/2</p> <p>pass [1] 117/11</p> <p>passed [1] 138/4</p> <p>passing [1] 74/1</p> <p>passwords [1] 24/16</p> <p>past [11] 23/6 48/15 49/11 99/14 99/19 99/22 110/5 125/23 131/23 136/22 156/18</p> <p>pasted [1] 204/19</p> <p>patched [1] 58/25</p> <p>patches [1] 120/6</p> <p>patent [1] 28/5</p> <p>path [1] 187/1</p> <p>patience [1] 201/16</p> <p>pause [8] 102/13 105/20 107/21 145/2 173/22 175/18 175/24 183/21</p> <p>PDF [1] 1/1</p> <p>pen [8] 27/11 41/4 101/14 101/17 101/24 102/2 107/6 119/9</p>
	<p>P</p> <p>package [3] 23/9 54/8 69/20</p> <p>page [35] 1/5 4/3 20/21 21/2 21/3 21/4</p>	

<p>P</p> <p>Pennsylvania [11] 92/23 94/14 94/25 95/8 95/13 95/16 95/21 95/25 96/5 134/21 148/6</p> <p>people [47] 10/20 17/25 37/24 41/21 44/4 48/24 49/5 52/16 58/6 72/13 77/2 85/21 86/6 86/9 88/17 91/11 91/12 93/3 93/12 93/17 94/4 98/15 98/23 99/2 100/18 103/20 119/14 122/16 133/13 137/24 138/2 138/5 138/19 139/4 145/11 155/22 156/6 156/8 156/18 156/20 156/24 157/10 169/19 170/6 170/7 173/11 173/13</p> <p>people's [1] 161/17</p> <p>per [1] 5/14</p> <p>percent [16] 52/12 56/23 56/25 57/8 57/18 91/7 91/11 91/12 93/3 93/5 93/17 124/20 125/1 125/4 125/7 125/8</p> <p>percentage [7] 26/2 89/24 90/3 90/8 90/12 90/16 93/9</p> <p>percentages [2] 33/4 93/8</p> <p>perfectly [2] 77/5 138/11</p> <p>perform [3] 165/8 184/11 195/19</p> <p>performed [7] 14/10 34/2 50/6 50/15 74/16 95/13 204/6</p> <p>Perhaps [3] 68/14 73/1 182/17</p> <p>period [5] 1/4 16/21 143/10 147/17 171/9</p> <p>permitted [1] 178/25</p> <p>Persinger [3] 196/21 197/23 207/10</p> <p>Persinger's [1] 108/4</p> <p>persists [2] 24/1 137/4</p> <p>person [34] 17/22 27/4 27/17 45/8 54/12 54/13 68/20 73/2 89/17 90/4 90/13 90/18 91/19 91/23 92/2 92/7 93/8 93/9 94/4 94/9 102/5 121/3 121/7 150/25 153/19 153/20 157/17 157/19 157/21 158/12 158/21 167/7 183/12 192/16</p> <p>personal [4] 30/8 30/10 161/23 170/5</p> <p>personally [5] 17/19 17/22 53/8 53/10 139/5</p> <p>PH.D [4] 4/4 7/7 153/7 200/1</p> <p>Ph.D. [1] 106/18</p> <p>Ph.D.-level [1] 106/18</p> <p>Philip [1] 175/8</p> <p>phone [2] 11/8 82/13</p> <p>photocopied [4] 81/9 81/11 81/12 81/18</p> <p>photocopy [2] 81/12 81/14</p> <p>photographs [2] 17/25 18/13</p> <p>physical [30] 9/8 9/10 9/16 15/21 15/22 16/1 17/20 17/23 20/1 21/13 24/5 25/5 25/13 35/19 59/14 59/17 59/23 60/1 60/21 60/23 74/1 74/19 104/13 114/4 114/24 116/9 118/8 144/20 145/5 155/24</p> <p>physically [5] 21/10 24/7 35/5 35/17 73/2</p> <p>pick [1] 196/22</p> <p>PICO [1] 3/4</p> <p>PICO-PRATS [1] 3/4</p> <p>picture [2] 25/24 25/25</p> <p>pictures [7] 18/9 18/12 18/21 25/23 26/2 26/6 26/9</p> <p>piece [13] 8/24 34/18 35/22 36/10 36/11 36/16 64/22 65/10 66/25 97/19</p>	<p>97/20 133/6 172/24</p> <p>pieces [5] 35/25 36/2 36/6 36/8 136/9</p> <p>place [29] 17/24 18/20 19/3 24/11 44/14 47/9 50/16 62/18 64/21 65/9 66/5 66/8 68/2 70/4 114/5 114/18 114/25 121/4 123/12 123/19 123/22 157/22 158/4 158/4 167/7 169/2 170/7 173/15 201/5</p> <p>placed [3] 63/24 167/20 168/22</p> <p>places [12] 19/10 19/12 25/21 26/9 56/11 62/17 62/19 91/9 93/21 93/23 94/2 138/22</p> <p>placing [2] 58/15 68/7</p> <p>plaintiff [6] 140/16 148/4 151/12 152/22 158/8 176/16</p> <p>plaintiffs [20] 1/5 2/2 2/13 2/18 7/15 22/15 51/23 108/17 109/9 109/21 110/11 152/4 175/8 176/16 189/14 191/24 192/8 198/3 199/18 206/10</p> <p>plaintiffs' [9] 4/3 5/21 5/22 6/16 7/5 19/17 141/3 141/7 141/12</p> <p>plan [1] 178/6</p> <p>plane [2] 9/13 149/4</p> <p>planning [1] 150/15</p> <p>plans [1] 122/21</p> <p>platform [1] 60/16</p> <p>play [4] 46/8 140/11 198/3 199/9</p> <p>played [3] 109/13 196/19 200/1</p> <p>please [19] 54/16 81/7 85/2 93/2 114/13 126/8 126/10 129/14 152/6 152/9 176/3 176/6 176/7 182/20 194/10 201/11 202/7 202/12 205/2</p> <p>pleasure [1] 173/24</p> <p>plenty [2] 54/25 206/2</p> <p>plugged [3] 66/11 66/12 171/16</p> <p>plus [1] 165/25</p> <p>PM [2] 144/17 207/14</p> <p>point [26] 6/15 8/21 27/20 38/21 44/22 83/17 85/23 86/12 86/22 86/24 87/1 89/21 97/17 105/17 124/1 124/7 135/21 136/13 164/15 168/21 181/21 187/8 190/15 190/25 196/6 204/17</p> <p>pointing [2] 15/12 66/8</p> <p>points [1] 15/9</p> <p>policies [2] 8/11 188/23</p> <p>policy [7] 143/2 143/5 143/9 143/17 146/9 180/7 188/25</p> <p>political [3] 37/8 59/10 111/4</p> <p>politically [2] 122/12 137/6</p> <p>politicizing [2] 40/19 110/2</p> <p>poll [10] 18/3 18/13 30/25 53/3 61/6 61/11 72/10 116/5 117/12 170/19</p> <p>pollbooks [1] 156/11</p> <p>polling [26] 17/24 18/10 18/20 18/21 19/3 19/9 19/12 25/21 26/9 50/16 62/17 62/18 62/19 70/4 94/2 112/17 114/5 121/4 123/12 123/19 123/22 131/4 157/22 158/3 167/7 173/15</p> <p>polls [3] 62/3 172/10 172/24</p> <p>Ponce [2] 156/4 156/7</p> <p>population [2] 93/16 93/17</p> <p>populous [1] 93/24</p> <p>portion [7] 1/4 47/2 91/22 92/1 118/14 129/17 166/18</p> <p>portions [2] 118/8 129/25</p> <p>posed [2] 89/2 117/3</p> <p>poses [1] 73/14</p> <p>posing [1] 141/13</p>	<p>position [2] 32/9 191/23</p> <p>positions [1] 146/2</p> <p>positive [3] 48/8 48/9 55/19</p> <p>positives [1] 69/5</p> <p>possessed [1] 42/21</p> <p>possibility [6] 15/15 82/23 100/14 136/24 162/13 168/11</p> <p>possible [17] 9/9 12/20 19/5 26/23 28/1 60/1 60/14 66/15 75/2 81/25 82/3 84/19 86/18 128/8 161/1 161/16 193/2</p> <p>post [3] 10/15 24/21 118/7</p> <p>posture [1] 134/6</p> <p>potential [12] 8/16 11/4 15/24 67/9 71/23 76/13 76/15 84/13 95/21 99/18 102/16 102/19</p> <p>potentially [15] 60/25 61/13 62/15 67/13 69/16 71/25 72/1 72/3 81/16 102/19 114/2 114/6 123/19 128/2 137/6</p> <p>power [4] 119/10 171/16 197/5 197/7</p> <p>powerful [1] 16/17</p> <p>practicable [1] 29/9</p> <p>practical [2] 55/13 68/24</p> <p>practice [3] 20/9 20/20 153/9</p> <p>practiced [2] 20/13 159/19</p> <p>practices [3] 20/15 20/18 115/7</p> <p>PRATS [1] 3/4</p> <p>precinct [18] 33/10 61/3 63/11 63/14 63/16 63/25 68/2 72/9 73/10 98/13 102/6 103/17 131/8 131/14 131/14 164/10 166/7 169/3</p> <p>precinct-based [1] 102/6</p> <p>precincts [6] 18/8 19/1 26/3 26/4 26/7 170/23</p> <p>precise [1] 113/4</p> <p>precision [1] 90/15</p> <p>predated [1] 86/9</p> <p>predating [1] 87/1</p> <p>predicate [2] 145/18 145/19</p> <p>predominantly [4] 25/20 30/6 32/6 90/7</p> <p>prefer [1] 157/17</p> <p>preferred [1] 9/5</p> <p>preliminary [1] 178/6</p> <p>premise [1] 98/25</p> <p>preparation [2] 66/4 204/4</p> <p>prepare [1] 54/19</p> <p>prepared [8] 50/3 50/11 52/5 59/25 66/4 196/9 204/7 204/20</p> <p>prescribed [1] 190/1</p> <p>present [9] 37/7 55/4 138/5 153/18 167/1 173/2 178/5 178/6 178/11</p> <p>presentation [2] 203/25 204/21</p> <p>presented [4] 40/10 99/15 172/18 186/7</p> <p>presenting [2] 36/12 204/10</p> <p>presently [1] 180/24</p> <p>preserve [2] 111/5 206/15</p> <p>president [3] 36/17 36/17 94/20</p> <p>President Biden [1] 36/17</p> <p>President Trump [1] 36/17</p> <p>presidential [1] 101/1</p> <p>press [2] 18/2 170/22</p> <p>pressure [1] 156/19</p> <p>presumably [4] 68/12 74/5 97/12 204/18</p> <p>pretrial [6] 110/21 111/14 111/15 204/25 205/3 205/22</p> <p>pretty [3] 160/7 166/8 191/15</p>
--	---	---

<p>P</p> <p>prevent [2] 17/16 115/1</p> <p>preventing [1] 98/23</p> <p>previously [6] 7/8 39/12 40/9 110/9 141/10 201/19</p> <p>PRICE [1] 2/2</p> <p>primarily [1] 122/13</p> <p>primary [13] 89/19 90/1 90/4 90/10 90/13 90/13 90/18 91/10 91/20 92/2 119/7 120/7 154/19</p> <p>principle [1] 42/18</p> <p>print [2] 62/25 127/11</p> <p>printed [9] 52/12 57/11 61/9 92/9 95/16 129/12 129/13 165/5 166/1</p> <p>printer [22] 34/23 34/24 35/2 35/2 35/5 35/6 35/13 35/17 35/19 58/17 58/23 58/23 59/5 59/14 59/15 59/18 59/19 59/23 81/15 116/19 116/21 156/15</p> <p>printers [1] 59/19</p> <p>printing [2] 61/24 71/5</p> <p>printout [1] 175/1</p> <p>prints [2] 28/13 154/5</p> <p>prior [10] 43/11 43/19 43/25 44/1 44/9 44/10 100/4 109/17 127/4 205/4</p> <p>privacy [5] 72/14 72/21 72/24 114/5 155/18</p> <p>privately [1] 138/4</p> <p>privilege [1] 187/19</p> <p>probably [10] 49/14 65/22 83/1 131/2 131/10 148/14 148/24 174/18 187/11 206/15</p> <p>problem [22] 9/2 9/4 9/5 9/6 9/13 9/14 9/15 24/1 39/3 39/4 70/14 70/18 80/4 103/2 112/8 123/4 164/7 169/14 169/16 183/3 185/2 186/21</p> <p>problems [16] 12/21 13/5 13/7 24/2 48/6 68/5 68/24 119/6 119/12 122/14 126/3 134/10 153/25 171/15 202/19 202/21</p> <p>Procedure [1] 108/22</p> <p>procedures [6] 21/17 21/25 22/1 22/3 117/5 118/10</p> <p>proceed [9] 83/15 105/13 122/22 151/5 151/22 175/19 178/3 178/14 181/18</p> <p>proceeding [2] 37/12 146/4</p> <p>proceedings [13] 1/10 1/21 102/13 105/20 107/21 108/17 145/2 173/22 175/18 175/24 183/21 207/13 208/9</p> <p>process [15] 14/17 46/20 66/4 67/16 67/18 68/11 73/23 88/16 88/17 119/7 122/15 174/18 177/18 184/14 187/19</p> <p>processes [4] 120/3 178/17 178/18 189/4</p> <p>produce [6] 27/21 27/23 28/11 28/16 41/20 69/6</p> <p>produced [9] 1/22 51/22 99/1 115/19 117/13 120/3 126/23 135/25 139/13</p> <p>produces [2] 27/4 27/17</p> <p>Professor [4] 140/13 151/24 175/20 175/21</p> <p>proffer [2] 111/4 151/7</p> <p>profile [2] 28/9 29/3</p> <p>program [1] 66/5</p> <p>programmatic [1] 50/13</p> <p>programmed [4] 15/18 46/21 69/2 69/10</p> <p>programming [1] 69/5</p>	<p>prohibited [1] 1/7</p> <p>project [1] 23/6</p> <p>projects [1] 73/24</p> <p>prompting [2] 52/15 53/3</p> <p>promptly [1] 12/20</p> <p>promulgate [1] 179/8</p> <p>propagating [1] 60/10</p> <p>properly [1] 108/21</p> <p>property [1] 29/21</p> <p>proposals [1] 27/25</p> <p>proposed [1] 205/21</p> <p>proposition [1] 66/10</p> <p>protect [1] 104/21</p> <p>protected [1] 21/10</p> <p>protecting [1] 17/11</p> <p>protection [2] 9/11 21/13</p> <p>protections [6] 16/1 16/4 24/5 25/13 116/10 116/17</p> <p>protective [3] 24/10 84/19 84/22</p> <p>provide [3] 56/4 130/14 190/13</p> <p>provided [11] 26/9 57/9 108/6 110/23 112/14 118/5 135/13 135/16 139/2 172/9 198/22</p> <p>providing [3] 9/12 110/24 199/4</p> <p>prudent [1] 132/10</p> <p>psychologist [2] 153/10 159/19</p> <p>psychology [2] 153/8 159/18</p> <p>public [16] 31/9 38/12 39/3 39/19 41/20 44/16 44/25 45/23 45/25 58/1 89/22 135/4 186/14 203/12 203/15 207/13</p> <p>publicly [5] 43/11 43/19 44/2 45/21 137/17</p> <p>published [1] 203/3</p> <p>pull [1] 157/24</p> <p>purchased [1] 59/20</p> <p>purpose [2] 59/9 62/6</p> <p>purposes [4] 40/15 64/20 72/24 78/11</p> <p>pursue [4] 38/5 101/10 105/11 108/2</p> <p>push [2] 155/13 165/8</p> <p>pushing [2] 147/18 165/11</p> <p>put [10] 35/12 61/10 115/2 119/8 119/13 141/10 156/14 164/24 199/22 201/7</p> <p>putting [4] 34/24 102/8 120/25 167/24</p> <p>PX [1] 115/3</p> <hr/> <p>Q</p> <p>QR [43] 15/1 28/15 42/8 46/12 48/2 50/12 66/9 67/22 68/2 68/3 68/7 68/8 68/11 68/12 68/14 68/15 68/16 68/19 68/23 68/24 69/2 70/4 70/10 70/16 70/17 70/24 142/6 144/20 144/25 145/4 145/7 145/19 146/5 146/23 147/8 166/12 168/5 168/17 180/4 180/16 180/16 181/9 183/3</p> <p>QR code [1] 70/24</p> <p>QR codes [1] 67/22</p> <p>qualification [2] 41/12 41/12</p> <p>qualifiers [1] 60/12</p> <p>qualify [4] 13/14 13/16 13/17 203/16</p> <p>quantification [2] 29/4 41/11</p> <p>quantified [1] 32/15</p> <p>quantifies [1] 32/18</p> <p>quantify [7] 13/10 29/2 41/1 41/3 41/9 74/10 75/25</p> <p>quantifying [3] 42/14 42/16 87/15</p> <p>question [65] 5/20 8/7 22/19 27/14</p>	<p>27/15 31/20 36/25 37/3 37/6 38/6 38/22 39/18 47/22 58/3 58/9 61/25 62/8 62/24 68/1 71/9 76/4 79/17 83/24 85/2 86/3 86/20 88/25 89/1 89/5 89/6 89/7 89/10 90/15 91/5 104/9 111/9 113/11 129/2 132/21 132/25 133/14 134/16 134/23 137/8 144/1 145/19 145/20 146/14 154/23 157/4 159/9 162/4 162/5 165/3 166/3 171/2 172/20 174/3 174/4 179/24 183/23 191/18 191/21 192/19 194/10</p> <p>questioned [1] 129/19</p> <p>questioning [2] 38/16 78/12</p> <p>questions [57] 7/22 12/9 39/5 40/20 58/13 78/18 83/19 101/10 103/25 104/11 104/12 105/22 107/23 108/1 108/2 108/8 111/5 112/6 114/13 119/2 127/19 127/23 128/2 128/22 129/9 131/12 134/14 136/5 139/18 141/13 141/15 141/17 144/8 145/13 147/12 154/16 154/17 154/18 154/19 154/20 155/9 158/15 173/23 174/25 175/3 176/19 178/12 179/1 179/16 186/9 187/13 187/15 188/21 189/17 194/20 194/22 198/17</p> <p>quick [8] 148/3 149/3 150/4 151/3 192/21 193/17 203/5 205/19</p> <p>quickly [3] 24/2 83/3 88/18</p> <p>quiet [1] 201/12</p> <p>quite [5] 23/17 24/4 62/15 95/6 113/22</p> <p>quo [1] 71/25</p> <p>quote [4] 110/1 110/2 126/19 179/16</p> <p>quoted [1] 37/4</p> <hr/> <p>R</p> <p>race [4] 39/15 47/20 103/7 202/18</p> <p>racess [6] 39/13 40/9 49/3 49/12 155/6 174/25</p> <p>radical [1] 42/16</p> <p>radically [2] 27/25 46/9</p> <p>RAFFENSPERGER [1] 1/6</p> <p>raise [9] 13/20 38/14 82/8 84/12 84/19 110/24 152/6 176/3 200/25</p> <p>raised [9] 52/18 85/3 86/11 87/20 97/5 97/11 100/11 111/3 157/22</p> <p>raising [2] 84/6 84/10</p> <p>RAMSEY [2] 2/5 198/16</p> <p>range [1] 56/23</p> <p>rate [3] 52/18 56/21 57/8</p> <p>rates [1] 124/21</p> <p>rather [8] 33/4 38/3 38/21 39/19 59/9 109/16 110/4 199/21</p> <p>rational [1] 100/25</p> <p>re [5] 94/23 94/24 103/1 103/6 142/13</p> <p>re-count [3] 94/23 103/1 103/6</p> <p>re-counts [2] 94/24 142/13</p> <p>reach [1] 184/14</p> <p>reached [4] 40/22 170/7 192/9 192/12</p> <p>read [20] 10/17 37/14 55/15 97/3 97/4 97/4 108/16 109/3 117/9 117/15 122/24 129/4 133/5 157/12 166/2 172/7 172/8 174/15 184/20 203/5</p> <p>read-only [1] 117/9</p> <p>readable [13] 24/20 42/9 46/15 47/2 70/12 72/2 95/17 118/8 118/14 165/13 166/1 166/12 166/18</p> <p>reader [9] 68/2 68/8 68/11 68/14 68/15 68/23 68/24 69/2 70/17</p> <p>readers [2] 70/4 70/13</p>
--	---	--

<p>R</p> <p>reading [3] 10/15 67/8 70/17</p> <p>reads [4] 117/9 117/11 118/7 185/14</p> <p>ready [2] 140/6 196/12</p> <p>real [13] 40/13 57/1 57/16 62/17 66/12 100/14 100/22 109/17 110/5 121/4 135/5 193/17 203/5</p> <p>reality [3] 22/18 76/14 76/16</p> <p>realize [4] 88/20 149/8 159/11 203/12</p> <p>realized [1] 32/8</p> <p>really [20] 39/24 71/1 107/1 128/21 147/24 148/11 156/2 156/23 158/6 160/15 160/15 165/7 167/14 174/11 174/19 175/14 182/24 186/10 186/12 197/15</p> <p>realm [1] 38/12</p> <p>realtime [1] 110/12</p> <p>reason [10] 37/8 40/17 56/16 58/19 66/11 99/10 99/16 100/25 136/21 151/18</p> <p>reasonable [1] 100/19</p> <p>reasonably [1] 41/6</p> <p>reasons [5] 14/7 38/2 47/18 55/18 172/4</p> <p>reassure [1] 196/7</p> <p>rebuttal [2] 6/14 104/23</p> <p>recall [41] 10/11 10/13 10/15 11/5 11/7 15/11 37/21 46/2 46/10 50/24 67/23 84/6 87/23 89/15 89/24 90/8 90/16 90/20 96/2 96/3 96/18 98/7 100/2 100/4 112/9 130/25 131/16 131/24 132/3 134/4 150/16 155/6 181/8 181/10 181/13 186/12 194/1 194/2 194/3 194/6 205/22</p> <p>recalled [1] 129/25</p> <p>receive [5] 163/12 163/22 177/11 179/16 195/8</p> <p>received [11] 23/10 25/16 101/21 138/3 153/9 177/22 179/12 179/14 179/22 180/14 182/19</p> <p>receives [1] 177/19</p> <p>recent [4] 22/25 23/9 23/15 149/20</p> <p>recess [1] 53/19</p> <p>rechecked [1] 142/1</p> <p>recognize [3] 182/18 182/24 206/9</p> <p>recognizes [1] 188/6</p> <p>recollection [4] 84/17 84/17 90/22 91/5</p> <p>recommendations [4] 20/16 58/18 118/22 126/20</p> <p>recommended [3] 21/24 136/4 193/24</p> <p>recommends [2] 20/22 24/13</p> <p>reconciliation [2] 118/10 118/25</p> <p>record [35] 27/22 28/12 39/3 45/10 63/6 89/3 95/17 101/19 102/8 104/5 104/21 108/16 110/19 111/18 129/11 129/21 135/11 135/18 138/21 139/6 139/9 150/13 152/11 159/5 161/20 172/17 176/7 179/2 194/17 198/13 201/6 201/8 203/15 205/19 206/12</p> <p>recorded [5] 34/7 62/17 99/3 133/7 138/25</p> <p>records [5] 26/21 63/18 102/23 118/9 203/12</p> <p>recover [3] 128/8 128/12 132/12</p> <p>recoverable [1] 168/1</p> <p>recovered [1] 123/24</p> <p>recreate [1] 67/12</p>	<p>Recross [2] 4/7 130/20</p> <p>Recross-Examination [2] 4/7 130/20</p> <p>rectify [2] 13/8 202/22</p> <p>redirect [7] 4/6 4/13 4/21 111/23 113/23 174/1 201/21</p> <p>redress [1] 158/9</p> <p>reduce [1] 122/15</p> <p>reduced [1] 58/21</p> <p>reduces [1] 102/6</p> <p>reduction [2] 13/11 75/23</p> <p>refer [1] 63/14</p> <p>reference [7] 18/9 26/8 42/7 56/21 80/7 105/11 137/8</p> <p>referenced [12] 18/8 25/4 50/22 51/6 54/6 125/21 126/6 126/19 130/23 135/23 139/15 201/5</p> <p>referencing [1] 1/5</p> <p>referendum [1] 154/17</p> <p>referred [1] 125/16</p> <p>referring [8] 23/5 63/15 63/17 65/21 78/5 97/17 127/2 135/14</p> <p>refers [1] 25/22</p> <p>reflect [2] 19/12 133/10</p> <p>reflected [5] 115/7 132/23 133/3 133/5 133/15</p> <p>reflects [3] 111/18 154/9 199/8</p> <p>refresh [2] 90/21 91/4</p> <p>regard [7] 141/22 145/3 178/9 180/14 202/18 204/1 204/1</p> <p>regarding [33] 7/22 14/13 18/7 19/1 20/15 21/13 21/20 22/10 25/5 50/21 51/6 53/1 53/3 78/22 80/7 82/8 83/18 88/22 90/9 91/5 107/25 108/24 111/4 112/25 116/14 131/12 134/8 137/14 138/22 177/3 177/6 177/14 188/22</p> <p>regardless [4] 46/5 107/12 148/15 157/16</p> <p>registered [4] 89/25 90/12 90/17 93/10</p> <p>regular [1] 158/3</p> <p>regulation [1] 22/17</p> <p>regulations [5] 21/12 21/19 22/10 22/14 53/2</p> <p>rejected [6] 92/5 141/24 142/3 142/4 142/11 146/25</p> <p>rejecting [1] 142/8</p> <p>rel [1] 109/5</p> <p>related [8] 36/1 61/25 88/5 90/3 97/14 136/23 137/8 180/4</p> <p>relating [1] 200/16</p> <p>relative [2] 108/8 134/23</p> <p>relatively [1] 66/15</p> <p>release [4] 44/10 44/10 141/1 191/11</p> <p>released [7] 5/23 5/25 43/11 43/12 44/2 45/16 45/17</p> <p>releases [1] 43/14</p> <p>releasing [1] 192/14</p> <p>Relevance [1] 11/21</p> <p>relevant [2] 12/1 109/2</p> <p>reliability [1] 125/23</p> <p>reliable [4] 27/5 27/18 28/16 100/19</p> <p>reliably [3] 62/21 62/23 75/8</p> <p>relied [4] 14/12 18/4 26/10 89/20</p> <p>relief [1] 158/9</p> <p>relieved [1] 196/14</p> <p>rely [7] 6/8 9/13 9/19 88/21 89/8 194/13 203/13</p> <p>relying [5] 19/13 36/11 41/16 56/13 141/12</p>	<p>remain [1] 88/15</p> <p>remains [1] 200/17</p> <p>remediate [2] 12/19 115/25</p> <p>remediated [3] 8/25 12/16 13/12</p> <p>remediating [2] 12/21 12/25</p> <p>remedies [1] 28/23</p> <p>remedy [7] 9/1 9/9 9/14 11/23 11/25 12/4 173/9</p> <p>remember [17] 7/2 37/23 44/7 67/24 67/24 81/3 114/19 124/16 125/24 127/25 131/19 131/22 154/12 172/12 174/16 174/19 198/16</p> <p>remind [2] 191/16 201/14</p> <p>reminder [1] 141/11</p> <p>remote [1] 73/19</p> <p>remove [3] 15/18 122/21 123/10</p> <p>removed [2] 48/4 189/11</p> <p>rendered [1] 96/21</p> <p>rendering [2] 32/1 107/7</p> <p>repeat [3] 85/2 129/2 162/5</p> <p>repeated [3] 61/24 114/21 116/11</p> <p>rephrase [4] 177/12 180/1 180/9 182/17</p> <p>replacing [1] 35/8</p> <p>replica [1] 120/16</p> <p>reply [1] 124/5</p> <p>report [128] 11/15 12/22 13/10 13/14 13/14 13/18 13/19 14/13 14/18 14/22 22/23 27/8 32/17 32/18 32/20 35/3 35/12 35/14 35/15 35/17 36/2 36/6 36/9 36/15 40/12 41/2 41/14 42/15 42/20 42/25 44/1 44/5 44/9 44/23 44/23 46/1 46/10 50/1 50/3 50/4 51/15 54/18 58/14 59/23 60/5 60/6 66/19 67/7 67/16 69/22 76/1 76/5 76/22 76/24 76/25 77/17 77/20 77/23 77/23 78/2 78/6 78/10 78/13 78/18 78/23 78/24 79/2 79/8 79/9 79/16 79/16 79/21 80/7 80/9 80/12 80/19 81/3 81/4 83/18 85/1 85/4 85/8 87/21 88/9 92/12 101/5 104/6 104/15 104/18 104/22 105/5 105/11 105/25 106/2 106/12 106/14 107/7 107/10 109/1 109/12 109/14 109/18 109/23 110/9 110/17 124/3 124/4 124/8 125/16 129/10 129/11 129/17 129/20 129/23 129/24 129/25 130/2 130/3 130/4 130/7 130/8 130/12 135/12 135/15 135/24 198/9 198/16 199/8</p> <p>reported [3] 24/2 31/8 170/22</p> <p>reporter [8] 1/3 1/6 1/23 159/12 197/15 198/12 208/6 208/17</p> <p>reporting [3] 31/3 31/6 93/11</p> <p>reports [11] 18/12 24/6 31/25 58/20 87/21 88/22 93/5 97/14 116/5 170/4 170/10</p> <p>represent [3] 66/9 158/19 176/16</p> <p>representation [1] 15/4</p> <p>representative [4] 19/9 19/14 186/8 191/18</p> <p>represented [1] 89/11</p> <p>reproduce [2] 17/13 17/18</p> <p>Republican [1] 154/20</p> <p>request [2] 84/16 129/8</p> <p>requested [4] 5/20 5/22 37/17 206/5</p> <p>require [6] 20/1 59/23 60/1 72/10 88/13 106/24</p> <p>required [8] 35/5 47/16 48/4 94/12 106/4 106/7 106/18 118/22</p>
--	---	--

<p>R</p> <p>requirement [4] 30/20 143/22 146/11 146/11</p> <p>requirements [1] 110/21</p> <p>requires [2] 73/25 118/20</p> <p>requiring [2] 123/7 173/11</p> <p>research [3] 126/23 136/5 204/6</p> <p>reserved [1] 6/14</p> <p>reside [1] 15/19</p> <p>residual [1] 94/3</p> <p>resilient [1] 16/9</p> <p>resolve [4] 122/25 144/12 196/20 196/21</p> <p>resolved [1] 191/1</p> <p>resources [2] 107/16 137/6</p> <p>respect [5] 151/6 189/7 190/17 193/22 194/9</p> <p>responding [1] 145/24</p> <p>response [2] 119/2 130/1</p> <p>responsibility [2] 74/20 178/1</p> <p>responsible [4] 74/18 177/2 177/5 177/7</p> <p>responsive [5] 88/24 89/1 89/6 89/7 89/9</p> <p>rest [2] 184/5 200/2</p> <p>restricted [1] 1/3</p> <p>result [16] 25/13 30/20 56/23 85/12 99/2 103/15 110/3 123/19 129/5 131/13 132/12 135/7 143/11 169/9 171/15 171/22</p> <p>resulted [1] 16/24</p> <p>results [19] 17/11 17/17 27/5 27/18 28/16 31/3 31/6 31/8 64/9 74/8 75/7 98/15 98/18 101/1 122/15 137/2 190/3 204/10 205/10</p> <p>retain [1] 190/2</p> <p>retained [1] 143/9</p> <p>retention [7] 143/1 143/5 146/9 147/9 180/7 188/22 188/25</p> <p>retrofit [1] 120/5</p> <p>returned [1] 143/9</p> <p>reverse [2] 67/15 67/18</p> <p>reverted [1] 98/20</p> <p>review [14] 52/17 90/21 109/3 154/8 154/10 155/25 165/9 165/9 174/8 174/12 174/15 178/6 190/19 203/14</p> <p>reviewed [7] 26/3 52/12 92/4 165/24 187/12 187/23 190/4</p> <p>reviewing [2] 118/9 155/11</p> <p>reviews [1] 18/16</p> <p>RICARDO [7] 2/19 2/22 4/20 176/16 201/3 201/18 203/24</p> <p>Rick [1] 164/1</p> <p>rid [3] 48/3 91/18 94/2</p> <p>right [362]</p> <p>rigorous [10] 14/17 24/21 26/25 75/10 75/12 75/16 103/7 103/18 118/7 118/24</p> <p>rise [2] 83/13 207/12</p> <p>risk [35] 13/11 15/1 15/3 24/19 28/9 28/12 28/18 29/3 32/18 41/9 41/10 47/16 47/18 48/1 48/5 48/7 48/10 48/14 49/2 49/7 49/10 54/14 69/25 74/10 75/8 87/11 87/15 100/12 100/22 102/6 103/1 117/3 118/21 120/12 121/6</p> <p>risk-limiting [16] 15/1 15/3 28/12 47/16 47/18 48/1 48/5 48/7 48/10 48/14 49/2 49/7 49/10 75/8 103/1 118/21</p>	<p>risks [16] 11/4 13/3 15/24 28/23 32/14 32/15 33/3 55/12 69/17 75/18 75/23 76/15 100/11 120/11 135/5 173/15</p> <p>ritual [1] 158/5</p> <p>RLAs [1] 104/14</p> <p>RMR [3] 1/23 208/6 208/16</p> <p>ROBBINS [1] 3/5</p> <p>ROBERT [2] 2/16 2/17</p> <p>robust [1] 116/10</p> <p>roles [1] 65/5</p> <p>roll [1] 174/18</p> <p>room [2] 196/10 207/3</p> <p>ROSS [1] 3/5</p> <p>rough [1] 154/25</p> <p>roughly [3] 25/22 54/11 155/6</p> <p>route [1] 30/3</p> <p>rule [22] 6/8 15/14 87/21 99/18 99/21 100/14 100/17 108/5 108/11 108/21 109/19 110/20 111/3 111/11 111/13 124/3 128/11 130/4 143/15 189/15 198/23 205/17</p> <p>Rule 26 [9] 87/21 108/5 108/11 109/19 111/3 111/11 111/13 124/3 128/11</p> <p>Rule 26's [1] 110/20</p> <p>Rule 403 [1] 189/15</p> <p>ruled [4] 78/8 101/5 104/23 111/2</p> <p>rules [4] 131/18 131/20 131/22 179/8</p> <p>ruling [7] 79/23 83/18 107/25 108/3 111/12 151/5 205/25</p> <p>rulings [1] 109/7</p> <p>run [6] 60/15 79/22 109/18 144/23 144/24 198/5</p> <p>running [3] 82/21 94/19 121/1</p> <p>runoff [2] 163/4 164/17</p> <p>runoffs [1] 85/13</p> <p>runs [1] 110/5</p> <p>RUSSO [1] 3/3</p> <p>S</p> <p>safe [6] 9/11 16/2 16/7 16/8 16/14 100/19</p> <p>safety [1] 66/14</p> <p>said [30] 23/12 54/11 65/9 68/21 70/11 70/19 78/9 86/4 96/14 99/24 101/13 101/19 107/11 113/8 124/19 129/3 132/4 141/5 142/2 147/21 157/6 157/8 157/9 164/2 169/22 169/23 174/14 176/1 180/6 208/10</p> <p>Saint [1] 153/7</p> <p>Saint John's [1] 153/7</p> <p>sake [1] 198/20</p> <p>same [35] 10/25 35/9 36/14 38/11 43/14 44/4 44/8 46/14 55/22 60/2 60/5 69/10 70/17 73/14 79/10 88/8 88/11 93/21 95/4 98/21 104/11 105/10 111/4 113/19 131/5 132/24 133/11 137/22 157/24 167/6 168/25 169/1 181/14 192/2 206/8</p> <p>sample [8] 19/3 19/6 19/9 57/23 57/25 58/4 125/5 167/25</p> <p>San [1] 93/25</p> <p>Sandy [1] 5/7</p> <p>Sarah [1] 153/5</p> <p>satisfied [1] 110/10</p> <p>satisfy [2] 75/17 118/5</p> <p>saw [4] 35/21 99/16 119/20 137/4</p> <p>say [49] 8/5 8/10 13/16 18/23 23/3 23/5 27/23 29/8 30/5 30/13 35/7 38/20 38/22</p>	<p>39/4 39/20 47/18 52/11 59/10 62/23 64/11 68/15 69/1 72/17 76/15 76/23 80/2 82/4 88/13 96/2 96/23 99/12 100/18 113/25 123/17 136/21 142/24 149/5 157/6 159/6 160/11 162/18 166/10 169/10 169/25 170/21 190/7 197/18 198/16 206/17</p> <p>saying [9] 21/22 92/8 125/18 150/1 169/18 170/7 171/14 185/20 197/13</p> <p>says [15] 12/20 20/8 20/20 21/9 21/16 22/6 55/12 104/24 105/1 117/17 126/23 127/10 154/24 165/9 188/6</p> <p>scalable [1] 104/19</p> <p>scale [1] 8/3</p> <p>scan [3] 63/12 63/14 102/6</p> <p>scanned [3] 62/12 69/6 102/24</p> <p>scanner [32] 33/10 61/5 61/10 61/12 63/24 69/3 70/18 80/21 81/9 82/1 88/5 101/18 101/22 102/15 102/17 123/23 128/6 129/4 132/7 132/9 144/3 154/6 156/17 156/21 167/8 167/10 167/13 167/20 167/22 168/1 189/11 189/12</p> <p>scanners [16] 46/11 46/14 46/21 73/10 80/18 81/17 81/22 127/24 128/2 129/6 132/8 132/11 143/25 169/16 170/8 171/14</p> <p>scenario [6] 32/25 63/3 123/21 124/18 124/23 125/1</p> <p>scenarios [1] 26/24</p> <p>scheduling [1] 196/18</p> <p>SCHEINMAN [1] 2/7</p> <p>SCHOENBERG [9] 2/3 121/12 130/24 131/2 131/7 150/7 150/10 150/12 150/15</p> <p>science [3] 77/3 121/8 135/4</p> <p>Sciences [1] 135/12</p> <p>scientific [2] 8/22 54/25</p> <p>scientifically [2] 41/19 55/6</p> <p>scientists [3] 125/22 135/15 135/16</p> <p>scope [4] 11/22 12/5 101/5 124/2</p> <p>screen [15] 72/13 72/15 72/16 72/24 73/3 114/2 114/4 114/7 132/19 132/24 155/12 155/13 165/7 165/25 166/3</p> <p>screens [1] 72/20</p> <p>sealed [2] 36/22 37/5</p> <p>seals [12] 24/10 25/15 25/15 25/20 25/23 25/25 26/1 26/3 26/5 26/7 115/6 116/6</p> <p>search [1] 104/25</p> <p>seat [4] 5/3 53/21 152/9 176/6</p> <p>SEB [9] 6/11 6/11 6/13 142/6 145/24 146/4 180/15 182/19 195/8</p> <p>second [20] 19/25 24/4 55/11 55/11 86/12 97/10 111/19 116/8 117/11 126/10 127/5 130/12 130/16 142/5 142/18 185/15 185/19 203/21 203/24 203/25</p> <p>Secondly [1] 38/4</p> <p>secrecy [5] 112/20 113/1 113/7 113/14 113/22</p> <p>Secretary [9] 16/6 87/20 87/25 91/15 115/20 122/21 177/25 178/3 179/10</p> <p>secrets [1] 69/21</p> <p>section [3] 19/24 107/9 126/6</p> <p>Sections [1] 109/11</p> <p>Sections 8.4 [1] 109/11</p> <p>secure [10] 8/6 8/6 8/6 12/23 24/7 29/6 29/10 29/24 55/4 95/1</p>
--	---	--

<p>S</p> <p>secured [4] 8/9 8/10 40/24 95/9</p> <p>securely [2] 17/6 55/19</p> <p>securing [4] 32/4 125/15 129/9 135/25</p> <p>security [66] 8/2 8/7 8/8 8/12 8/14 8/14 8/19 9/8 9/10 9/16 9/19 13/20 15/21 15/22 16/1 17/20 17/23 18/2 24/17 25/5 30/7 30/15 30/19 30/19 31/17 31/22 32/6 33/3 41/1 41/16 41/17 42/12 42/14 42/18 43/7 48/8 48/11 52/21 54/21 54/23 55/7 69/17 70/14 71/13 73/16 74/19 86/1 88/5 88/8 88/14 114/25 115/7 116/9 117/3 117/18 119/3 119/7 119/15 120/4 120/5 120/7 122/25 134/6 136/3 136/15 173/15</p> <p>see [30] 52/9 58/1 81/17 83/9 84/18 86/12 91/8 93/20 93/24 115/17 118/16 126/21 127/8 127/14 128/19 130/3 133/6 143/17 154/8 155/22 158/2 167/19 167/19 173/1 173/6 182/12 182/14 184/25 191/12 207/9</p> <p>seeing [3] 86/8 158/1 158/6</p> <p>seek [2] 65/16 94/23</p> <p>seeking [6] 6/21 6/22 65/15 122/13 130/2 158/9</p> <p>seem [1] 97/5</p> <p>seemed [1] 62/4</p> <p>seems [3] 45/6 190/14 191/15</p> <p>seen [23] 18/21 20/18 24/13 24/14 25/12 25/21 25/23 25/24 60/9 60/13 115/19 115/23 117/13 117/21 118/18 118/24 121/8 138/19 155/23 172/24 190/15 203/10 205/1</p> <p>selected [1] 19/6</p> <p>selection [1] 31/9</p> <p>selections [4] 15/4 127/11 165/5 165/24</p> <p>self [2] 60/10 131/2</p> <p>self-evident [1] 131/2</p> <p>self-propagating [1] 60/10</p> <p>selling [1] 28/4</p> <p>Senate [2] 84/14 135/22</p> <p>senators [1] 85/9</p> <p>send [1] 164/3</p> <p>SENIOR [1] 1/12</p> <p>sense [9] 14/5 27/19 41/10 45/9 71/24 135/18 145/5 174/17 188/5</p> <p>sensitive [2] 69/21 82/14</p> <p>sent [5] 68/18 139/7 163/19 166/24 189/4</p> <p>sentence [4] 55/12 127/5 127/10 157/8</p> <p>separate [3] 117/11 187/17 191/20</p> <p>separately [1] 6/19</p> <p>September [1] 34/22</p> <p>September 2020 [1] 34/22</p> <p>serious [4] 9/15 191/1 202/19 202/21</p> <p>seriously [2] 195/15 195/18</p> <p>serve [1] 30/14</p> <p>served [2] 6/6 30/12</p> <p>server [4] 73/21 73/23 85/16 116/12</p> <p>service [1] 119/8</p> <p>set [6] 63/12 88/11 107/15 131/5 139/4 208/12</p> <p>setting [1] 24/17</p> <p>seven [3] 82/19 92/7 92/9</p> <p>seven minutes [1] 82/19</p> <p>seventh [1] 117/14</p>	<p>several [12] 23/2 23/12 24/12 36/2 36/6 49/11 67/7 76/23 119/20 119/25 174/14 202/3</p> <p>severe [2] 134/10 135/5</p> <p>SHANNON [3] 1/23 208/6 208/16</p> <p>ShareFile [1] 139/13</p> <p>she [27] 5/23 5/25 6/2 6/7 94/20 94/24 140/23 141/7 141/11 141/19 148/2 169/22 169/23 169/23 171/9 185/4 187/8 188/6 188/6 190/15 190/25 191/2 196/9 196/12 196/15 198/13 198/13</p> <p>she's [11] 6/11 6/11 148/4 161/23 161/25 171/2 171/8 187/21 187/23 190/13 198/12</p> <p>sheet [1] 182/23</p> <p>shield [2] 72/23 73/3</p> <p>shields [1] 114/5</p> <p>short [8] 140/12 140/16 144/12 150/21 151/15 191/8 197/19 198/4</p> <p>shorten [1] 150/16</p> <p>should [11] 30/19 30/20 119/12 123/18 129/21 132/2 148/25 173/12 173/12 173/16 182/17</p> <p>shouldn't [1] 78/16</p> <p>show [7] 88/1 110/3 110/12 120/2 181/24 182/9 205/13</p> <p>shown [3] 27/8 27/9 110/23</p> <p>shows [3] 57/2 57/2 205/24</p> <p>shut [2] 15/20 205/2</p> <p>sic [2] 129/24 186/2</p> <p>side [2] 41/7 185/24</p> <p>sideways [1] 156/17</p> <p>sight [1] 111/20</p> <p>sign [1] 123/3</p> <p>signal [1] 176/2</p> <p>signature [13] 142/6 142/14 142/17 144/20 144/21 145/4 145/4 145/4 145/5 146/22 180/16 180/16 181/9</p> <p>significance [2] 33/1 108/14</p> <p>significant [14] 19/13 20/19 27/13 32/24 43/13 44/3 47/21 49/6 63/4 63/5 70/15 92/1 134/9 136/4</p> <p>significantly [3] 13/20 87/18 90/5</p> <p>signs [1] 142/21</p> <p>similar [5] 43/15 95/10 95/11 100/11 137/22</p> <p>simple [5] 120/5 120/24 123/13 137/1 183/23</p> <p>simplify [1] 56/10</p> <p>simply [9] 40/19 40/19 70/23 99/4 161/22 170/20 180/9 197/6 206/4</p> <p>since [21] 10/19 25/10 36/9 50/7 83/7 86/15 128/18 129/8 135/1 136/4 136/14 136/20 148/24 159/15 159/19 160/8 160/11 164/18 176/24 197/15 197/17</p> <p>single [5] 49/13 50/16 72/7 140/10 190/11</p> <p>sir [3] 5/17 78/16 206/20</p> <p>sit [3] 25/11 182/25 194/7</p> <p>sites [1] 112/18</p> <p>sitting [3] 18/23 48/16 141/6</p> <p>situation [5] 69/12 133/12 139/25 140/3 191/13</p> <p>situations [4] 131/21 133/9 133/15 133/24</p> <p>sixth [2] 116/25 117/14</p> <p>sizes [2] 18/19 19/11</p> <p>skews [1] 93/18</p>	<p>skill [1] 76/17</p> <p>skills [4] 42/22 76/21 76/24 106/19</p> <p>skips [1] 165/21</p> <p>Skoglund [6] 148/5 148/25 148/25 149/6 149/21 196/22</p> <p>Skoglund's [1] 139/16</p> <p>slate [3] 57/9 57/17 57/20</p> <p>slice [1] 58/1</p> <p>sliding [1] 8/3</p> <p>slightly [1] 138/14</p> <p>slow [1] 66/2</p> <p>small [6] 58/8 98/19 99/4 119/22 138/16 154/13</p> <p>smaller [1] 119/18</p> <p>Smart [2] 60/19 61/23</p> <p>Smart card [1] 61/23</p> <p>smash [1] 98/17</p> <p>snapshot [1] 85/22</p> <p>so [262]</p> <p>software [61] 8/23 8/24 9/3 9/4 9/6 11/1 11/18 12/25 13/6 13/21 17/17 20/25 23/25 43/10 43/17 43/18 44/2 45/15 45/20 45/22 45/23 58/25 59/19 60/21 60/24 65/7 66/23 66/25 67/4 67/5 71/2 71/4 71/8 71/11 71/13 71/16 73/6 77/2 87/1 98/11 100/11 115/24 117/2 117/6 117/10 119/6 120/3 120/6 120/20 123/10 134/8 137/19 137/20 137/21 137/22 138/1 138/4 138/8 138/9 138/15 138/23</p> <p>soldered [1] 35/12</p> <p>soldering [1] 35/5</p> <p>solve [2] 11/18 71/17</p> <p>some [74] 7/22 9/20 10/8 18/3 20/12 27/24 28/17 28/21 30/1 31/24 33/25 40/21 43/6 44/3 44/25 53/5 53/7 58/14 64/13 66/13 69/5 70/6 70/14 73/18 80/20 86/16 87/18 91/14 92/20 93/24 94/24 95/11 95/19 95/19 97/14 104/23 106/24 112/6 114/3 114/13 114/17 121/5 122/5 129/9 136/16 136/16 138/22 139/6 140/8 141/13 141/19 145/21 151/18 160/13 160/16 160/21 160/22 160/23 160/25 166/6 171/4 171/22 172/4 189/2 189/3 190/13 190/15 196/6 196/15 197/13 198/17 198/17 204/21 205/22</p> <p>somebody [7] 62/3 62/3 62/5 105/1 106/17 140/20 181/23</p> <p>someone [16] 9/7 60/20 61/2 61/9 62/13 63/7 63/20 64/25 68/14 76/13 98/13 98/17 119/9 119/12 133/7 204/18</p> <p>something [33] 8/19 22/17 30/20 37/4 46/22 48/17 57/14 59/6 63/11 64/18 69/12 76/13 78/25 119/21 120/24 123/13 124/19 124/20 132/11 140/9 149/7 165/18 165/21 166/5 168/12 169/22 172/6 190/19 199/6 199/16 199/19 199/23 204/18</p> <p>sometimes [7] 62/19 118/20 118/20 132/17 169/10 172/12 197/5</p> <p>somewhat [2] 28/8 52/18</p> <p>somewhere [1] 54/15</p> <p>soon [4] 12/20 140/3 144/15 193/2</p> <p>sooner [1] 83/10</p> <p>soothe [1] 196/6</p> <p>sophisticated [2] 71/2 71/2</p> <p>sorry [33] 14/24 21/2 21/5 21/22 31/4</p>
---	---	---

<p>S</p> <p>sorry... [28] 33/18 35/14 43/25 56/22 60/12 65/25 66/23 73/23 76/4 82/19 97/23 100/3 104/2 126/11 128/24 133/2 143/15 145/15 147/7 157/2 157/5 159/11 160/24 165/3 183/7 192/11 195/24 202/10</p> <p>sort [12] 9/11 55/20 58/21 70/18 77/1 81/11 81/11 89/23 104/11 107/8 135/18 156/15</p> <p>sought [1] 94/24</p> <p>sound [3] 140/1 147/10 164/21</p> <p>sounds [3] 45/5 149/1 164/22</p> <p>source [3] 25/18 37/2 171/16</p> <p>sources [3] 18/12 19/6 139/14</p> <p>South [2] 91/19 91/21</p> <p>South Carolina [2] 91/19 91/21</p> <p>Southern [2] 91/9 93/24</p> <p>SOUTHWEST [1] 1/24</p> <p>sow [5] 98/9 98/14 103/14 122/19 137/2</p> <p>sowing [1] 98/22</p> <p>space [1] 10/19</p> <p>span [1] 136/17</p> <p>SPARKS [1] 2/9</p> <p>speak [2] 146/3 186/11</p> <p>speaking [2] 24/25 38/7</p> <p>special [2] 155/4 160/23</p> <p>specific [18] 13/7 24/12 32/25 39/15 44/7 50/4 58/13 66/5 66/6 66/10 71/9 74/12 77/18 77/19 77/22 92/11 95/7 129/20</p> <p>specifically [15] 8/3 14/21 15/12 24/25 34/6 35/12 36/5 81/5 81/7 105/2 108/23 132/21 132/25 134/8 180/13</p> <p>specificity [1] 190/13</p> <p>specs [2] 154/12 172/13</p> <p>speculating [1] 18/17</p> <p>speculation [2] 161/15 190/14</p> <p>spell [2] 152/10 176/7</p> <p>spending [1] 22/13</p> <p>spent [2] 54/11 54/17</p> <p>spoke [2] 163/23 200/11</p> <p>spots [1] 198/8</p> <p>spread [1] 84/8</p> <p>springs [2] 5/8 82/20</p> <p>squeeze [2] 156/18 168/19</p> <p>SR [1] 2/23</p> <p>stack [1] 185/10</p> <p>stand [6] 52/6 53/18 96/17 201/4 201/11 206/21</p> <p>stand-in [1] 52/6</p> <p>standard [9] 8/21 8/22 20/9 33/2 41/18 41/19 41/23 120/17 172/24</p> <p>standardized [1] 33/24</p> <p>standards [3] 8/11 8/18 41/17</p> <p>standing [3] 61/9 167/14 171/9</p> <p>stapling [1] 126/3</p> <p>Stark [10] 140/14 149/16 149/19 149/22 175/9 175/15 175/20 175/21 176/1 196/23</p> <p>start [10] 14/24 23/21 79/14 89/3 120/7 144/9 149/20 149/21 165/3 175/20</p> <p>started [5] 5/6 7/14 80/2 115/23 161/1</p> <p>starts [2] 127/7 148/16</p> <p>state [74] 3/2 11/3 16/3 16/6 16/7 16/14 16/17 17/7 17/12 22/25 23/10</p>	<p>25/16 25/20 33/24 47/25 49/5 68/1 71/15 85/25 86/13 91/15 92/4 112/7 115/6 115/20 116/12 117/5 119/13 122/21 132/1 132/4 132/6 135/6 136/8 137/4 141/6 141/18 143/4 143/10 143/14 143/21 146/10 146/11 152/10 153/24 158/11 158/19 160/13 163/20 164/6 173/10 176/6 176/20 177/1 177/21 177/22 177/25 178/3 178/6 178/8 178/13 179/7 179/10 179/11 186/7 186/13 187/20 191/17 193/22 194/5 194/8 195/5 200/4 206/5</p> <p>state's [3] 30/15 151/16 198/5</p> <p>state's Election [1] 30/15</p> <p>stated [3] 19/25 119/1 208/11</p> <p>statement [5] 20/5 20/7 100/20 127/16 170/1</p> <p>statements [2] 171/12 171/18</p> <p>states [19] 1/1 1/12 1/24 43/14 48/13 48/22 58/6 90/6 109/4 109/6 116/25 122/12 136/11 136/14 137/7 172/4 208/3 208/7 208/17</p> <p>statewide [6] 48/14 49/2 49/7 49/9 49/9 132/10</p> <p>status [2] 71/25 79/2</p> <p>stay [1] 148/6</p> <p>Stein [4] 94/18 94/19 94/23 97/25</p> <p>Stein's [1] 94/15</p> <p>stemming [1] 86/1</p> <p>STENOGRAPHY [1] 1/21</p> <p>step [10] 27/1 48/8 48/9 48/10 106/22 106/25 107/2 107/3 119/9 121/23</p> <p>steps [7] 106/25 108/24 109/9 109/13 109/22 110/15 119/23</p> <p>Sterling's [1] 122/20</p> <p>stick [1] 119/9</p> <p>sticks [4] 10/25 11/1 75/20 75/24</p> <p>still [21] 7/2 26/22 26/25 28/7 28/10 28/11 43/7 45/6 74/3 74/14 81/10 81/22 91/17 94/13 100/7 144/11 173/17 186/10 190/25 201/14 201/23</p> <p>stipulate [1] 22/15</p> <p>stipulation [1] 191/9</p> <p>stolen [1] 43/9</p> <p>stop [4] 82/12 82/14 157/11 158/11</p> <p>store [1] 179/15</p> <p>stored [1] 73/6</p> <p>story [1] 147/9</p> <p>straightforward [4] 65/1 65/5 66/16 66/16</p> <p>strike [3] 80/6 88/22 172/17</p> <p>strong [2] 28/12 48/5</p> <p>strongly [2] 27/21 27/22</p> <p>students [3] 50/25 51/17 77/3</p> <p>study [19] 51/21 52/2 52/4 52/5 52/22 52/22 52/24 55/9 55/24 57/3 58/9 58/10 73/13 102/17 120/20 124/15 136/1 136/7 202/3</p> <p>studying [1] 54/12</p> <p>stuff [1] 193/6</p> <p>stuffing [2] 63/19 63/21</p> <p>Stuxnet [1] 75/19</p> <p>style [3] 14/10 59/12 75/19</p> <p>subject [7] 79/4 82/10 82/15 92/12 95/21 112/14 112/15</p> <p>subjected [2] 161/13 162/9</p> <p>submit [1] 200/10</p> <p>submitted [9] 31/25 32/9 42/20 88/19</p>	<p>88/19 109/2 125/22 191/10 200/3</p> <p>submitting [2] 61/21 199/18</p> <p>subpoena [4] 5/23 6/1 6/6 191/11</p> <p>subsequent [2] 24/6 182/24</p> <p>substance [4] 7/14 83/19 105/3 195/15</p> <p>substantial [5] 93/16 99/10 171/9 185/12 188/13</p> <p>substantially [1] 44/25</p> <p>substantive [4] 38/24 78/14 110/20 195/11</p> <p>substitute [2] 191/18 206/13</p> <p>successfully [3] 30/7 77/6 121/21</p> <p>such [28] 13/15 24/24 27/23 30/21 57/17 58/7 60/7 60/14 60/17 62/22 68/5 70/6 70/9 74/8 74/24 90/7 91/9 99/13 110/3 118/13 126/24 133/24 166/14 170/23 177/19 178/9 179/18 181/8</p> <p>suffered [1] 16/21</p> <p>suffers [1] 27/9</p> <p>sufficiency [3] 14/14 14/19 41/8</p> <p>sufficient [16] 26/20 41/1 41/5 41/7 41/16 41/20 42/12 42/14 47/19 47/21 52/25 69/15 74/6 114/25 119/3 120/15</p> <p>sufficiently [9] 26/17 40/24 75/10 75/12 75/15 95/1 95/9 103/7 109/10</p> <p>suggest [2] 52/24 205/25</p> <p>suggested [1] 205/23</p> <p>suggestion [1] 97/12</p> <p>Suite [3] 184/10 186/6 186/22</p> <p>Suite 5.5-A [2] 184/10 186/6</p> <p>SullivanStrickler [9] 10/8 10/12 85/17 85/21 86/6 86/9 86/25 87/4 139/14</p> <p>SullivanStrickler's [1] 112/11</p> <p>sum [1] 93/10</p> <p>summarize [1] 108/22</p> <p>summarized [1] 70/19</p> <p>summarizing [1] 187/6</p> <p>summary [1] 19/24</p> <p>summer [2] 44/8 137/9</p> <p>summon [1] 66/23</p> <p>superuser [2] 27/11 119/22</p> <p>supplement [1] 205/8</p> <p>supplemental [1] 87/21</p> <p>supply [4] 35/18 59/18 59/21 60/2</p> <p>support [4] 56/7 71/8 108/23 202/1</p> <p>supporting [1] 110/8</p> <p>suppose [4] 30/11 30/18 31/11 95/11</p> <p>supposed [3] 165/7 165/12 186/8</p> <p>sure [52] 12/5 15/12 16/18 17/7 18/5 19/9 21/21 22/4 23/17 31/11 39/14 45/17 48/25 53/15 61/21 67/24 72/22 75/25 76/4 76/10 78/5 78/10 83/2 88/11 90/23 97/2 102/12 102/25 105/16 111/17 125/18 131/23 138/24 151/8 151/8 159/5 160/22 161/19 162/7 164/3 166/21 170/24 171/4 183/8 183/15 184/2 184/21 188/4 190/10 192/11 193/14 203/5</p> <p>surface [1] 82/5</p> <p>surgery [1] 149/20</p> <p>surprisingly [1] 147/13</p> <p>Swap [1] 146/2</p> <p>sworn [6] 7/8 152/8 152/17 176/5 176/12 201/19</p> <p>symposium [6] 44/8 45/23 137/10 137/11 137/17 138/18</p> <p>symptom [1] 13/22</p> <p>synchronized [2] 69/9 69/10</p>
--	--	---

<p>S</p> <p>system [99] 7/24 8/5 8/8 8/15 11/12 12/18 13/4 13/21 14/9 16/9 16/12 20/2 22/7 23/8 27/4 27/7 27/17 27/24 28/4 29/6 29/11 29/24 29/25 29/25 30/6 30/9 30/17 31/10 32/7 32/15 32/18 33/7 33/14 41/20 43/8 55/3 55/5 58/24 63/1 63/2 63/6 66/24 69/15 70/3 70/6 70/9 70/22 70/22 74/4 74/6 74/24 75/2 75/5 76/6 80/22 80/25 81/1 81/8 81/21 84/9 87/18 88/10 88/14 98/6 100/5 100/8 100/16 100/19 101/3 102/1 102/6 103/3 103/17 103/23 107/12 107/14 107/14 107/17 109/24 110/13 114/21 117/19 119/10 119/24 120/6 120/13 122/17 128/7 133/12 133/23 134/3 141/24 142/7 146/19 161/18 169/10 179/23 189/23 190/9</p> <p>systemic [1] 123/4</p> <p>systems [16] 7/23 29/14 29/20 31/17 31/19 31/20 32/14 32/16 32/19 32/20 42/17 74/17 115/16 137/14 177/6 177/15</p>	<p>teach [2] 121/15 121/17</p> <p>tech [3] 45/8 98/10 103/19</p> <p>technical [10] 40/24 70/6 76/17 76/21 76/24 76/25 77/1 187/14 187/15 202/22</p> <p>technically [1] 46/18</p> <p>technician [3] 34/3 49/24 120/25</p> <p>techniques [3] 29/15 29/17 30/3</p> <p>technological [1] 106/19</p> <p>technologies [1] 136/3</p> <p>technology [4] 8/17 32/4 63/12 173/14</p> <p>TED [1] 1/24</p> <p>tell [11] 32/22 37/24 50/19 73/13 102/18 123/2 123/8 123/16 144/4 184/6 196/12</p> <p>telling [2] 138/2 148/21</p> <p>ten [13] 12/12 13/12 18/18 25/22 26/5 58/18 82/22 140/12 147/13 150/22 151/23 197/24 198/6</p> <p>ten minutes [6] 82/22 140/12 147/13 150/22 197/24 198/6</p> <p>ten-minute [1] 151/23</p> <p>tendered [3] 184/3 184/3 205/15</p> <p>tendering [1] 184/22</p> <p>term [1] 28/14</p> <p>terminology [1] 33/25</p> <p>terms [10] 11/23 15/21 24/3 32/14 34/17 53/23 60/9 135/12 136/19 196/18</p> <p>terrible [1] 149/11</p> <p>territory [1] 128/11</p> <p>test [3] 67/10 67/13 120/23</p> <p>tested [4] 46/22 81/17 81/20 119/13</p> <p>testified [23] 7/8 10/7 11/13 12/6 12/16 18/7 26/16 33/23 89/18 92/6 92/20 94/15 95/24 98/5 110/1 131/25 132/15 152/17 174/8 174/21 176/12 201/19 205/10</p> <p>testifies [1] 124/11</p> <p>testify [2] 6/3 160/7</p> <p>testifying [9] 45/10 89/15 96/3 159/22 171/21 194/1 194/3 200/3 200/5</p> <p>testimonial [1] 110/18</p> <p>testimony [30] 6/15 7/15 7/18 10/24 13/10 31/16 31/21 80/7 93/1 96/6 96/7 96/8 97/3 99/24 100/10 104/22 109/13 122/20 122/24 134/20 135/13 141/3 151/24 159/13 170/13 171/5 172/8 202/2 205/9 208/12</p> <p>testing [15] 13/25 14/3 14/6 14/8 14/10 14/14 14/15 14/19 17/12 40/14 46/23 117/23 117/24 118/3 118/3</p> <p>Texas [2] 92/1 92/3</p> <p>Texas' [1] 92/4</p> <p>text [15] 24/20 42/9 46/11 46/15 49/16 50/12 65/21 70/12 72/2 95/17 95/25 96/4 115/13 165/13 166/1</p> <p>than [39] 11/14 14/18 32/20 32/25 33/4 38/3 40/10 42/1 48/12 48/22 48/23 58/24 59/3 59/9 64/13 64/19 65/22 68/15 68/23 71/8 81/18 96/14 98/11 102/5 109/17 110/5 122/3 126/10 137/7 137/19 149/8 150/22 174/19 179/24 183/1 184/12 186/11 187/8 200/15</p> <p>thank [65] 5/16 6/23 7/4 19/22 23/23 40/4 45/2 45/13 53/17 79/6 83/11 84/4 87/8 89/13 91/6 97/7 101/11 105/19 105/21 106/10 111/1 111/6 114/9 120/9 126/5 127/18 129/7 130/5 134/2 140/21 151/10 152/20 158/3 158/15 162/20</p>	<p>173/25 175/3 175/6 175/7 176/18 176/18 177/17 178/15 179/3 180/8 185/7 190/23 191/3 191/5 193/19 195/21 195/22 195/24 198/2 199/24 201/10 201/15 201/16 205/18 206/20 206/23 206/24 206/25 207/7 207/11</p> <p>Thanks [1] 40/3</p> <p>that [1378]</p> <p>that's [39] 12/19 14/21 15/17 32/11 39/16 45/3 48/3 50/10 67/25 68/23 79/15 79/18 88/21 90/11 92/3 103/6 104/3 120/2 134/13 146/6 148/2 150/3 150/14 159/21 161/3 167/18 167/23 168/25 173/23 176/22 185/21 186/18 194/11 196/14 198/14 199/16 204/12 205/12 207/6</p> <p>their [45] 17/14 19/1 29/18 48/5 49/21 50/22 51/7 52/12 52/16 52/17 53/2 53/3 53/6 58/11 67/10 69/13 70/10 70/11 71/18 72/14 72/24 88/17 90/10 92/2 93/6 93/7 98/20 99/2 99/6 99/10 107/16 110/25 114/4 120/20 125/2 132/18 132/22 155/18 155/19 155/23 157/22 158/2 170/10 178/12 189/11</p> <p>them [40] 11/3 15/8 49/1 57/12 57/23 58/4 61/10 67/22 69/10 69/25 69/25 81/5 81/7 82/21 91/18 99/7 106/15 106/18 106/24 120/15 123/6 131/23 132/5 139/5 149/25 157/24 157/24 158/2 158/3 164/1 166/25 167/7 174/12 184/8 187/10 188/3 201/5 201/6 201/8 206/23</p> <p>themselves [4] 68/9 87/4 163/19 171/17</p> <p>then [79] 6/22 9/14 12/25 18/13 23/12 30/2 34/13 37/2 38/14 39/20 39/21 39/25 45/20 54/17 57/9 63/8 68/19 70/21 75/8 79/13 80/5 80/16 84/8 102/25 104/21 104/22 108/4 119/21 120/5 120/22 122/22 123/9 133/14 135/25 136/4 140/13 140/15 140/16 140/16 146/24 148/5 149/3 149/22 150/22 152/2 160/14 162/21 163/4 163/9 164/17 164/18 165/1 165/8 165/9 165/12 165/12 170/19 171/11 171/12 173/17 175/20 177/24 178/1 178/6 178/8 178/11 178/13 180/6 181/18 185/18 189/19 191/4 196/19 196/21 198/13 199/20 200/19 201/7 206/22</p> <p>there [181] 6/9 8/7 8/10 8/18 8/18 8/21 9/1 9/1 9/12 11/13 11/16 12/8 12/23 12/23 13/15 14/2 15/5 15/22 15/25 15/25 15/25 16/4 23/12 24/12 26/6 27/2 27/6 27/6 27/7 27/15 28/7 28/7 28/17 29/13 30/16 35/9 35/11 37/22 38/5 38/8 38/16 40/17 41/18 44/15 46/7 47/18 54/22 54/24 54/24 54/25 56/12 61/2 62/15 65/21 68/4 68/23 70/5 70/21 72/19 75/10 75/23 79/24 80/1 80/3 91/12 92/15 93/21 93/23 95/8 95/12 97/24 98/10 99/13 99/13 99/14 102/4 102/13 103/6 103/7 104/18 104/24 105/12 105/20 107/1 107/21 108/2 111/25 119/16 119/20 119/24 119/25 123/11 125/1 127/6 129/15 133/4 133/9 133/14 133/24 134/9 136/16 138/2 138/5 138/21 139/6 139/13 143/11 144/6 145/2 145/7 145/21 145/21</p>
---	--	---

<p>T</p> <p>there... [69] 145/23 146/4 151/18 155/6 155/7 155/21 155/24 156/2 156/19 161/15 161/20 161/20 161/20 166/3 166/4 166/5 166/14 166/16 167/14 167/25 168/5 168/18 168/21 168/21 168/22 169/12 173/12 173/17 173/22 174/24 175/18 175/24 179/22 181/2 181/23 183/9 183/18 183/21 185/15 186/5 186/8 187/6 187/24 189/2 189/3 189/5 189/6 189/8 189/10 190/1 190/11 190/24 191/6 192/16 193/24 196/20 198/18 201/4 202/19 202/21 203/12 203/19 204/14 204/17 204/22 204/24 205/6 206/7 207/8</p> <p>there's [5] 26/16 42/16 99/12 119/11 146/20</p> <p>thereby [3] 40/5 144/10 151/11</p> <p>therefore [1] 110/6</p> <p>therein [1] 208/11</p> <p>these [45] 12/19 13/7 19/25 20/8 20/9 20/11 20/12 20/13 20/15 20/20 22/14 22/24 23/2 23/14 24/25 26/8 26/9 38/25 46/23 55/18 68/25 69/8 69/15 106/14 106/21 107/14 110/15 118/3 118/11 118/21 119/12 119/13 141/17 141/21 143/3 143/24 145/12 151/21 160/16 186/12 189/22 189/22 193/8 199/1 201/7</p> <p>they [112] 10/24 17/14 20/3 22/5 24/2 26/23 27/25 31/9 38/2 46/8 48/5 48/25 49/10 52/17 56/4 56/6 56/10 56/12 56/16 56/19 57/12 57/12 57/14 58/5 68/9 68/10 71/22 72/3 72/14 72/21 73/3 73/10 74/5 76/2 81/3 87/3 87/5 88/11 88/18 88/18 90/2 90/12 91/18 91/21 91/24 91/25 93/11 94/2 98/19 99/6 104/25 104/25 105/2 106/15 106/17 118/21 120/19 121/2 121/2 122/23 123/14 123/17 124/20 131/20 132/9 132/24 133/11 136/15 140/8 141/10 142/1 142/3 142/19 142/19 143/7 143/20 144/8 146/14 150/3 155/19 156/8 156/9 156/11 156/14 156/14 164/3 164/4 164/4 165/23 170/7 170/10 170/10 171/16 172/5 178/4 178/4 178/5 180/10 185/5 186/15 187/9 187/11 187/11 187/14 187/22 189/25 190/13 196/24 196/25 203/12 206/1 206/17</p> <p>thing [11] 13/15 35/9 58/7 80/4 98/21 104/5 127/22 149/3 150/4 154/12 205/19</p> <p>things [25] 15/17 17/25 37/23 38/3 38/11 40/23 49/4 58/20 63/8 67/8 72/16 82/17 83/4 86/16 87/5 87/14 98/16 104/14 106/16 114/1 143/3 160/14 162/13 171/18 203/20</p> <p>think [131] 6/13 6/15 6/18 10/17 11/2 11/9 12/19 16/16 17/9 22/16 23/3 27/8 27/12 28/5 28/17 29/9 30/1 37/16 38/2 38/5 38/15 38/19 39/5 39/12 41/6 42/7 43/7 43/17 43/21 43/22 44/13 44/20 45/3 46/8 46/18 54/11 54/14 61/19 63/3 63/9 63/10 68/22 69/12 70/15 78/14 78/20 80/8 80/11 82/3 82/14 82/24 82/25 83/9 84/1 89/9 93/25 94/20 95/6 97/16 98/14 99/14 99/14 100/13 106/14</p>	<p>107/16 108/8 111/16 111/21 113/8 113/23 124/23 124/23 126/3 128/10 135/3 136/8 136/13 137/3 140/11 140/16 141/14 142/19 142/19 142/20 144/2 146/18 147/4 147/11 148/11 148/14 148/20 148/24 150/22 151/20 155/4 156/8 157/9 164/4 168/21 169/16 172/16 172/20 173/15 173/18 175/23 176/1 176/1 178/25 179/24 183/9 183/14 184/8 185/22 187/1 187/5 187/21 187/22 188/8 188/10 190/24 192/12 193/14 193/24 194/11 194/13 195/4 198/21 199/14 199/17 199/18 206/7</p> <p>thinking [2] 83/1 120/4</p> <p>thinks [1] 39/2</p> <p>third [9] 11/5 21/6 69/24 92/15 94/19 116/14 142/9 143/1 146/8</p> <p>third-party [1] 94/19</p> <p>this [279]</p> <p>thorough [1] 202/20</p> <p>those [91] 9/3 9/13 9/20 11/2 12/15 16/10 18/3 18/12 18/15 18/21 21/25 22/1 23/14 24/15 25/1 25/23 26/5 26/14 28/3 31/18 31/24 32/7 32/8 36/8 44/5 46/8 46/16 47/23 49/13 56/7 56/14 57/19 60/12 63/24 67/3 68/6 71/20 74/1 74/8 76/8 85/4 85/20 86/5 88/8 88/8 91/11 92/23 93/8 93/17 107/11 108/9 109/14 116/9 116/17 120/23 121/3 121/5 123/13 123/16 123/17 123/17 123/24 125/4 131/19 131/21 136/6 136/9 141/20 144/6 148/19 162/13 163/7 163/17 171/11 171/18 171/18 180/23 186/14 190/8 194/9 195/10 195/10 195/14 196/21 197/22 198/21 198/21 198/23 198/24 206/6 207/9</p> <p>though [8] 27/25 33/23 70/16 82/7 106/12 131/23 145/18 198/1</p> <p>thought [15] 36/21 38/6 38/15 39/16 59/6 105/7 105/8 105/13 110/2 119/12 129/20 131/23 131/24 156/25 169/23</p> <p>thousands [3] 19/1 125/9 190/5</p> <p>threat [15] 17/9 26/20 26/25 73/15 76/12 83/23 104/8 107/8 107/9 107/13 107/15 112/2 136/2 137/3 137/5</p> <p>threatening [1] 149/1</p> <p>threats [10] 8/9 46/1 46/4 46/7 46/8 102/4 107/11 135/22 136/18 137/4</p> <p>three [14] 6/13 6/13 61/9 61/17 69/8 69/9 141/18 143/3 147/3 147/6 147/8 150/24 156/23 157/11</p> <p>three minutes [2] 156/23 157/11</p> <p>through [31] 9/6 23/15 39/12 45/18 46/22 54/9 60/2 74/1 77/10 78/18 83/10 86/15 97/19 97/20 108/19 109/6 119/7 119/22 120/5 121/23 123/4 128/6 131/24 156/6 156/23 162/2 168/19 172/7 190/16 197/5 203/5</p> <p>throughout [2] 21/17 206/8</p> <p>Thus [1] 110/10</p> <p>time [61] 6/3 22/13 38/11 51/25 53/9 54/15 54/17 57/17 57/25 59/15 68/10 72/7 77/6 82/14 82/25 84/21 85/7 85/23 86/15 102/10 103/24 106/4 106/7 107/18 110/24 122/1 122/2 136/17 137/13 139/3 143/10 144/14 147/17 147/19 151/14 152/3 153/18 156/20</p>	<p>163/10 163/10 163/12 163/25 164/2 169/21 171/9 174/20 176/18 184/21 184/23 189/15 190/15 190/18 192/3 192/18 192/20 195/23 198/3 198/20 198/24 206/2 206/8</p> <p>timeline [1] 44/8</p> <p>times [8] 76/23 92/5 121/1 121/20 133/18 156/2 164/14 166/9</p> <p>timing [1] 86/21</p> <p>tired [1] 197/9</p> <p>title [1] 30/13</p> <p>today [29] 5/19 6/16 7/14 18/24 25/11 27/3 27/16 27/20 28/2 29/24 30/4 48/16 77/2 92/14 108/15 118/19 135/3 140/24 148/16 158/10 179/20 181/4 181/6 182/25 194/7 196/21 197/16 200/17 201/6</p> <p>today's [1] 46/4</p> <p>together [1] 136/19</p> <p>told [5] 82/21 88/18 88/23 179/25 180/2</p> <p>ton [1] 204/24</p> <p>Tony [2] 115/2 115/12</p> <p>too [16] 24/24 37/1 37/23 37/24 97/16 122/9 136/21 150/17 151/1 156/25 157/10 183/18 187/11 197/6 197/9 199/12</p> <p>took [11] 44/14 47/9 57/17 57/25 85/25 106/16 120/14 122/1 122/2 156/5 195/19</p> <p>top [3] 21/6 104/6 115/13</p> <p>topic [4] 39/25 52/23 53/12 128/5</p> <p>topics [7] 80/16 112/5 114/10 120/10 122/4 124/14 136/6</p> <p>total [2] 29/19 155/9</p> <p>totally [1] 165/22</p> <p>TOTENBERG [1] 1/11</p> <p>touched [1] 31/24</p> <p>touches [1] 32/17</p> <p>traditional [2] 71/5 71/16</p> <p>trail [1] 42/5</p> <p>training [2] 160/1 160/4</p> <p>transcript [10] 1/1 1/5 1/7 1/8 1/10 1/22 37/15 159/13 199/9 208/9</p> <p>transcripts [1] 1/2</p> <p>transparent [1] 104/20</p> <p>travel [2] 149/7 149/19</p> <p>traveling [1] 182/19</p> <p>treat [1] 190/2</p> <p>treats [1] 81/18</p> <p>tree [1] 5/8</p> <p>tremendous [1] 119/19</p> <p>trial [8] 1/10 97/2 110/11 110/23 122/21 159/23 192/3 196/16</p> <p>tricked [1] 176/1</p> <p>tried [4] 164/3 174/11 191/21 196/7</p> <p>tries [1] 121/18</p> <p>trouble [4] 130/18 163/7 163/10 163/11</p> <p>true [19] 14/21 43/23 44/19 68/23 72/1 73/12 88/16 92/3 101/23 101/25 132/6 132/20 167/18 167/23 167/25 179/9 181/21 181/22 208/9</p> <p>Trump [3] 36/17 37/17 38/3</p> <p>Trump/Biden [2] 37/17 38/3</p> <p>trust [1] 99/5</p> <p>trustworthy [1] 168/2</p> <p>truth [4] 89/11 181/17 185/3 186/25</p> <p>try [9] 16/16 106/14 123/4 129/12</p>
--	--	---

T	95/5 113/4 143/19 170/17 170/18 171/3 171/8 179/1 183/24 183/24 186/20 189/22 199/18	109/18 110/11 110/12 117/19 122/9 137/1 137/22 138/12 204/6
try... [5] 129/16 154/7 164/25 189/18 203/12		useful [4] 63/18 97/5 97/5 198/14
trying [31] 28/5 38/5 39/7 44/7 44/7 56/17 61/3 61/8 63/8 65/16 67/24 76/11 81/3 101/9 104/22 107/19 135/18 140/20 143/17 144/11 149/15 156/8 178/19 180/9 181/16 187/3 189/18 190/16 191/25 192/17 201/13	understands [2] 140/19 183/8	user [3] 56/2 56/4 56/5
TSx [1] 60/16	understood [3] 65/15 80/2 194/18	user-friendly [2] 56/2 56/5
TSxs [1] 42/1	undertake [1] 15/23	uses [8] 14/4 27/7 46/5 47/25 71/8 91/17 91/19 137/20
tuned [2] 140/18 160/13	undertaken [2] 102/17 205/14	using [17] 15/1 24/16 26/25 34/2 68/23 74/22 75/23 109/22 116/19 120/13 120/17 123/22 136/11 136/15 153/21 164/9 167/6
turn [8] 19/16 55/8 97/10 114/13 115/11 126/8 127/4 156/17	underway [1] 5/19	usually [4] 9/19 153/20 156/10 158/4
turned [2] 73/8 156/11	undetected [2] 49/20 100/15	
TURNER [1] 1/24	unfolds [1] 6/15	V
Turning [2] 20/21 116/18	unfortunately [4] 99/12 99/17 100/23 100/24	validated [5] 12/13 12/15 12/21 99/15 100/23
turns [1] 155/14	unified [1] 117/17	value [2] 97/2 158/5
twice [2] 162/23 162/25	unify [1] 24/17	variety [2] 8/25 119/5
two [28] 5/5 5/22 38/25 44/15 63/18 69/9 83/7 85/9 103/19 109/7 117/7 119/22 138/16 143/22 144/9 147/2 147/6 147/8 156/6 163/7 164/14 165/7 189/17 194/21 201/4 202/1 205/22 206/22	Unintelligible [1] 148/13	various [8] 7/23 15/9 18/10 26/3 34/1 35/9 137/14 195/7
two days [1] 5/22	unique [2] 24/16 117/11	varying [2] 8/1 19/11
two hours [1] 156/6	unit [6] 34/14 34/23 35/5 35/13 58/16 64/2	veer [1] 38/1
two minutes [1] 144/9	UNITED [8] 1/1 1/12 1/24 109/4 109/6 208/3 208/7 208/17	verifiable [1] 29/14
two-year [1] 143/22	units [4] 69/8 69/9 69/9 80/19	verification [6] 52/18 52/20 55/9 57/8 124/15 136/6
type [13] 9/5 9/7 15/5 26/17 26/19 47/5 47/15 49/8 56/22 61/19 110/17 139/6 146/15	universal [1] 16/11	verified [12] 88/11 89/20 89/22 90/2 90/9 90/11 90/16 91/2 91/7 93/4 116/3 138/18
types [1] 104/14	University [4] 16/20 16/24 17/2 153/7	verify [10] 27/21 29/18 58/11 67/21 69/24 69/25 70/10 84/2 125/2 167/20
typical [3] 33/4 58/6 68/15	unless [4] 78/15 97/19 127/10 147/13	verifying [1] 127/13
typically [11] 8/8 9/4 9/10 9/22 20/9 58/7 58/20 153/18 154/4 154/22 177/20	unlikely [3] 42/5 46/23 82/3	verse [1] 42/18
TYSON [20] 3/6 4/6 4/8 22/25 27/6 41/3 70/5 85/2 89/2 89/7 103/4 104/4 104/6 114/11 125/14 126/7 127/23 129/22 129/24 134/22	unlikely [3] 13/20 14/11 124/19	version [11] 11/18 39/8 39/11 137/18 137/19 138/11 138/13 138/13 138/14 203/9 206/18
Tyson's [1] 119/2	unlock [1] 60/23	versions [2] 40/10 71/7
	unnecessary [1] 117/2	versus [8] 16/11 32/5 32/19 42/18 44/18 62/12 154/2 199/16
	unring [1] 38/20	very [61] 11/25 23/24 23/24 24/9 29/13 30/2 33/23 37/7 51/24 55/18 58/8 59/6 59/6 63/4 63/5 66/5 69/21 70/15 83/3 86/14 91/18 93/24 97/20 104/20 119/16 119/16 121/18 122/18 128/16 129/23 129/24 135/15 136/25 136/25 137/22 138/6 138/6 138/16 140/1 147/13 151/3 154/13 156/16 158/15 160/12 167/25 175/4 175/6 185/12 187/5 190/5 190/23 191/7 191/17 191/17 192/21 195/24 196/5 196/8 196/14 207/6
	until [7] 37/3 98/19 147/18 152/1 159/9 160/14 186/17	via [2] 64/2 84/9
	untouched [1] 12/18	victory [2] 77/24 78/1
	untrustworthy [1] 154/2	video [29] 34/13 34/20 35/21 47/1 64/3 72/5 108/12 108/18 108/20 108/24 109/9 109/13 109/16 109/21 110/11 110/17 110/19 110/22 140/5 140/6 140/10 151/15 196/19 197/19 197/20 197/21 197/21 198/4 199/9
	unusable [1] 127/13	videotaped [1] 199/25
	up [34] 37/11 38/9 39/4 56/23 63/6 63/12 73/5 82/6 87/19 107/5 113/10 115/2 119/9 124/20 127/22 127/22 128/5 130/1 131/5 134/17 141/2 153/4 155/22 166/6 169/19 171/11 174/3 196/22 197/6 198/24 201/7 202/18 206/13 206/16	view [2] 6/12 72/13
	update [9] 9/3 9/4 9/6 11/17 24/2 100/11 117/6 117/9 167/5	viewed [2] 165/25 192/1
	updated [1] 36/8	views [1] 32/13
	updates [9] 12/17 20/25 23/25 88/5 88/9 88/12 88/14 88/19 115/24	VINCENT [1] 3/3
	upgrade [1] 70/21	violating [1] 155/18
	upgraded [1] 71/15	violation [3] 177/24 178/12 179/18
	uploaded [1] 20/3	virtualization [2] 67/13 120/17
	upon [2] 141/12 170/4	virtually [1] 127/12
	us [13] 139/2 139/19 139/20 144/6 145/16 152/21 170/10 176/19 181/25 184/6 192/6 194/7 201/5	visible [8] 26/1 26/3 26/6 26/7 114/1 114/3 122/13 136/25
	usage [2] 90/5 93/19	
	USB [7] 10/25 11/1 34/14 75/20 75/24 108/19 116/20	
	use [37] 20/10 24/12 25/24 29/6 30/4 31/14 55/19 56/11 57/19 61/3 61/8 62/6 67/8 68/3 75/20 86/1 89/25 90/9 92/1 92/6 92/8 92/14 93/4 107/8 108/19 108/20 109/15 110/6 115/5 117/9 117/11 117/23 120/19 131/3 153/21 158/12 173/16	
	used [40] 10/1 10/25 11/1 11/12 27/3 27/16 28/1 29/11 33/20 38/2 43/8 43/14 70/1 70/23 74/4 74/4 75/19 80/22 80/25 81/8 81/21 83/7 83/23 89/16 89/18 91/22 92/9 104/8 107/12 108/22 108/25	

<p>V</p> <p>VOLUME [1] 1/10</p> <p>volunteers [1] 204/5</p> <p>VON [2] 2/10 4/7</p> <p>vote [56] 29/7 34/7 55/22 56/11 56/19 57/9 57/10 57/23 65/17 66/9 91/11 91/23 92/7 94/3 94/8 94/9 94/11 99/10 122/2 123/16 125/16 129/10 135/25 153/14 153/16 153/17 153/18 153/20 153/24 154/1 154/4 155/13 156/10 157/14 157/17 157/21 158/4 158/13 159/3 159/6 161/4 161/8 163/13 165/6 165/11 165/14 165/15 167/9 167/25 168/12 169/19 170/20 173/11 173/18 174/5 189/24</p> <p>voted [18] 63/24 68/16 155/1 160/7 160/11 162/16 162/21 162/23 163/1 163/4 164/9 164/14 164/15 164/17 164/23 165/2 165/4 168/18</p> <p>voter [43] 29/18 48/8 52/16 52/18 55/9 60/25 61/1 61/3 61/8 61/16 62/5 68/13 70/16 72/10 72/13 72/21 72/23 73/2 82/6 99/10 102/8 102/24 114/3 114/6 118/10 121/8 124/15 127/10 127/13 130/22 131/7 131/9 131/10 132/15 132/22 133/10 133/15 136/5 155/15 167/5 171/17 203/25 206/6</p> <p>voter's [1] 114/2</p> <p>voters [61] 27/4 27/17 29/7 29/12 31/14 47/13 49/21 50/21 51/6 53/1 53/3 53/5 53/8 55/21 56/18 57/5 57/8 57/16 57/19 57/22 57/24 58/3 58/8 58/11 62/17 68/9 69/12 70/9 71/18 71/22 71/23 72/1 73/1 89/17 89/25 90/3 90/12 90/17 90/19 91/19 91/22 92/1 92/7 93/10 93/12 94/8 94/11 99/5 100/25 113/15 122/14 123/16 125/2 125/4 125/7 125/8 125/9 132/17 132/19 155/16 158/12</p> <p>voters' [3] 15/4 27/22 128/8</p> <p>votes [16] 36/17 46/11 98/15 99/2 110/4 123/17 123/24 128/8 128/12 161/17 161/18 165/9 166/25 167/21 190/5 202/19</p> <p>voting [89] 8/12 8/13 8/13 10/8 10/12 15/21 21/10 21/13 22/11 29/14 30/17 45/4 45/6 53/9 56/3 56/4 57/13 63/13 63/20 72/14 80/25 81/1 85/25 89/19 89/20 89/22 90/1 90/2 90/9 90/10 90/11 90/14 90/17 90/18 91/3 91/7 91/10 91/20 92/2 92/2 93/4 93/8 93/12 93/18 94/4 95/1 95/17 98/23 100/16 101/13 107/5 112/1 112/2 112/8 112/12 113/17 114/21 115/24 116/6 116/11 116/14 121/24 122/3 122/16 122/17 127/11 133/13 133/23 153/23 155/24 156/4 156/4 156/18 156/21 157/17 160/13 160/21 160/25 161/1 163/8 163/14 165/1 174/6 177/6 177/15 178/17 179/11 179/23 189/23</p> <p>vs [1] 1/5</p> <p>vulnerabilities [44] 7/23 7/25 8/17 11/11 11/14 11/24 11/25 12/13 12/15 12/17 12/20 12/24 13/1 13/12 13/19 13/22 15/6 20/1 20/11 27/8 27/12 41/13 42/22 58/20 78/3 80/24 81/2 82/7 85/1 85/5 85/6 85/7 88/4 100/23 106/2</p>	<p>109/23 110/13 110/15 115/25 118/12 120/21 120/23 134/11 193/3</p> <p>vulnerability [20] 8/24 9/8 9/17 9/18 9/23 11/19 27/10 58/15 58/17 58/22 58/24 58/25 60/19 60/20 81/9 81/22 84/14 106/4 106/7 106/8</p> <p>vulnerable [1] 114/6</p> <p>W</p> <p>wait [12] 128/23 142/20 144/22 144/22 145/1 145/1 145/1 155/21 157/10 159/9 163/16 195/24</p> <p>waiting [4] 140/23 156/20 170/20 187/9</p> <p>walk [3] 82/6 107/5 166/10</p> <p>walking [1] 37/8</p> <p>want [48] 9/17 10/5 16/19 33/25 38/14 47/1 48/5 53/12 59/13 60/8 64/5 64/17 64/18 73/19 79/4 80/2 80/2 83/16 86/24 104/20 104/25 104/25 105/16 107/24 115/10 123/21 125/14 127/22 129/2 141/16 144/14 149/24 149/25 174/4 178/25 179/2 181/18 183/8 184/20 187/1 187/18 188/20 190/13 191/8 198/24 200/24 203/22 206/4</p> <p>wanted [16] 5/12 6/17 7/22 17/13 84/2 98/9 104/4 108/2 108/4 108/8 130/1 134/16 159/5 161/9 173/18 201/14</p> <p>wanting [4] 38/14 55/20 162/2 206/13</p> <p>wants [4] 38/18 105/5 122/19 173/16</p> <p>warehouse [1] 73/6</p> <p>was [308]</p> <p>Washington [2] 10/15 49/17</p> <p>wasn't [11] 31/20 65/15 78/9 86/19 86/20 96/8 156/2 156/9 166/5 204/25 207/1</p> <p>waste [1] 189/15</p> <p>watch [3] 152/1 157/24 167/7</p> <p>watched [3] 34/13 72/15 121/23</p> <p>watcher [1] 170/19</p> <p>watchers [2] 18/3 18/13</p> <p>way [54] 5/9 9/5 9/16 9/18 12/8 14/8 22/20 23/22 24/20 29/8 29/18 33/1 34/6 46/19 50/4 55/19 56/17 57/9 62/13 69/7 69/11 69/16 70/16 70/17 75/18 85/13 93/25 97/16 98/16 103/18 103/21 104/23 114/3 119/25 123/13 123/18 131/5 132/24 147/15 148/22 153/23 156/7 157/22 158/7 161/16 161/17 166/13 166/14 166/16 168/1 185/13 192/10 203/20 204/17</p> <p>ways [21] 8/25 9/1 9/3 20/19 29/10 35/10 35/11 36/7 38/8 50/13 56/12 60/5 87/18 95/11 98/10 114/1 119/20 120/23 121/5 136/16 165/15</p> <p>we [185] 5/4 5/6 5/13 5/14 5/19 5/19 5/21 6/5 6/6 6/6 6/12 6/13 6/15 6/16 6/19 6/20 6/24 7/14 7/20 8/7 9/19 10/21 16/13 16/16 17/10 19/20 27/19 32/25 34/13 35/16 35/21 36/21 36/22 37/3 37/7 38/7 38/9 38/14 38/19 38/20 39/17 39/20 40/8 40/12 41/5 41/5 41/15 51/4 51/9 52/5 52/8 52/11 52/19 52/24 54/14 54/22 55/8 55/19 56/19 57/3 57/7 59/4 59/9 59/12 59/12 59/24 63/22 64/5 64/8 64/18 65/14 66/3 66/4 66/14 72/15 80/6 82/21 82/21 84/21 84/22 85/8 86/16 87/14 87/17 92/25 97/9 99/16 102/25</p>	<p>103/1 104/6 104/10 105/6 105/8 108/1 108/6 108/8 108/8 108/13 111/6 111/18 126/12 129/13 129/16 129/18 130/11 136/1 137/3 137/4 140/5 140/7 140/10 140/15 141/11 144/22 146/21 147/15 147/23 147/24 148/8 148/9 148/19 148/22 149/16 150/6 150/9 150/21 150/24 151/14 151/17 151/20 151/23 152/2 158/11 158/19 163/9 166/24 172/18 173/2 175/19 176/1 176/1 179/15 180/23 181/2 181/18 182/25 183/9 183/11 187/13 188/10 188/14 190/10 190/24 191/9 191/17 193/17 194/14 196/3 196/18 196/19 197/5 197/18 197/25 198/17 198/24 199/4 199/9 200/9 200/11 200/11 200/19 200/22 201/6 201/25 202/21 203/16 203/18 204/1 205/1 205/1 206/6 206/8 206/16 207/4 207/5</p> <p>we'll [18] 6/22 53/16 80/16 83/6 83/6 129/12 129/12 144/8 148/9 150/13 151/3 175/17 175/20 197/18 197/21 199/22 199/23 200/17</p> <p>we're [49] 9/21 33/3 33/25 67/5 79/24 80/1 80/8 97/19 102/3 103/22 104/24 108/7 109/4 115/3 128/10 140/6 140/11 140/25 144/11 144/12 144/15 144/16 147/4 148/14 148/20 149/15 150/6 150/10 150/15 151/2 161/19 161/22 175/21 184/5 185/9 186/24 187/1 189/19 190/12 191/13 191/14 196/3 197/19 198/15 198/20 199/22 200/10 201/13 204/15</p> <p>we've [9] 15/9 44/15 68/18 69/4 144/19 172/20 194/13 197/4 203/10</p> <p>weak [1] 116/17</p> <p>weapon [1] 59/7</p> <p>website [6] 89/20 90/9 90/17 90/21 91/3 202/25</p> <p>week [3] 10/24 147/24 197/10</p> <p>weekend [1] 148/6</p> <p>weeks [3] 54/12 54/13 123/9</p> <p>WEIGEL [1] 3/8</p> <p>WEINHARDT [1] 2/6</p> <p>WELCH [3] 1/23 208/6 208/16</p> <p>welcome [2] 79/5 88/18</p> <p>well [94] 8/4 10/25 12/2 21/21 25/15 27/6 32/17 35/1 37/10 39/7 43/6 45/17 46/7 46/18 48/9 48/18 54/25 56/4 62/2 62/15 63/6 63/9 63/12 66/2 68/4 72/12 74/25 75/6 78/13 78/20 78/25 81/11 83/6 86/15 89/9 98/12 103/16 108/7 111/16 111/18 113/18 114/24 116/16 120/14 122/13 123/1 123/3 123/25 124/10 127/7 130/3 130/14 132/4 132/6 135/20 136/3 136/18 136/23 137/5 143/12 145/10 145/16 146/21 147/18 147/20 148/19 148/21 151/25 153/23 154/12 155/1 163/4 164/13 167/18 170/25 178/19 180/2 181/1 181/8 185/11 189/17 192/9 194/7 195/19 196/3 197/12 199/20 200/15 202/17 203/7 204/9 204/14 205/3 205/15</p> <p>well-defined [1] 54/25</p> <p>well-designed [1] 127/7</p> <p>went [5] 13/8 61/10 72/15 156/21 163/13</p> <p>were [149] 11/1 11/13 13/12 18/12</p>
---	--	--

<p>W</p> <p>were... [145] 23/12 24/2 24/12 38/5 40/9 40/10 44/1 44/3 45/18 50/18 51/15 51/21 51/22 51/22 57/3 57/8 62/12 64/21 65/9 65/14 70/3 70/13 73/10 78/3 78/23 82/21 84/13 84/21 84/22 85/8 85/8 85/9 85/13 86/8 86/16 86/23 95/1 95/8 95/9 95/21 96/11 96/17 102/24 102/24 103/10 103/12 105/9 108/25 109/10 110/9 110/16 112/6 112/11 112/17 114/16 116/10 116/17 117/4 117/5 117/6 119/1 119/2 119/16 119/20 119/25 120/10 122/4 123/5 123/17 123/22 124/14 124/18 125/1 127/2 128/5 128/15 128/16 129/6 130/22 131/12 131/14 136/1 138/5 140/8 140/15 141/24 142/1 142/3 142/4 142/11 142/19 142/19 143/8 143/9 150/6 150/9 155/6 155/7 156/6 156/8 156/18 163/15 164/4 165/23 166/25 167/21 168/18 168/22 170/19 170/19 170/23 171/18 173/17 179/25 180/4 180/5 180/6 184/12 184/15 186/5 187/9 187/15 189/11 191/10 192/8 193/21 193/24 194/3 194/4 194/5 195/4 196/5 197/18 201/4 201/4 201/25 201/25 202/1 202/19 202/21 204/6 204/14 206/6 206/14 207/13</p> <p>weren't [9] 36/21 53/24 53/24 92/8 167/1 167/3 171/14 171/16 172/14</p> <p>what [187] 5/7 5/14 5/25 6/20 6/21 6/21 8/11 8/13 8/14 11/14 11/23 12/2 12/4 12/6 13/11 13/16 15/12 16/10 16/10 18/7 19/8 20/19 21/22 23/3 23/4 23/9 26/2 29/10 29/16 30/13 31/7 32/3 33/6 35/12 35/25 37/16 38/9 38/13 38/18 38/20 39/2 39/7 39/16 41/1 41/18 44/14 44/20 50/14 51/4 54/23 57/13 57/24 58/21 59/11 63/17 66/14 68/6 68/20 70/10 70/19 71/3 71/8 71/20 74/10 75/6 77/19 78/10 78/23 86/8 86/16 88/23 89/10 89/24 90/8 90/16 97/2 97/9 97/17 97/17 97/18 101/7 101/19 103/22 105/7 107/15 107/16 113/25 116/11 116/21 118/21 119/17 122/10 123/22 124/23 125/19 126/12 126/16 127/2 128/13 129/5 130/9 132/4 135/10 135/14 135/19 136/1 138/24 139/9 141/15 141/20 142/2 142/10 142/14 143/5 143/13 143/17 143/19 143/23 144/4 145/9 145/18 145/19 146/15 146/15 147/6 147/21 150/1 150/5 150/8 151/2 151/7 157/6 157/7 157/8 158/8 162/5 166/2 169/13 171/5 171/10 171/19 173/9 174/15 174/19 174/22 176/25 177/13 178/8 178/18 178/19 178/19 178/20 179/20 180/4 180/5 180/20 180/24 181/13 181/16 181/20 182/9 182/15 183/24 184/5 184/6 185/20 186/20 187/6 188/7 189/6 189/18 190/7 191/1 192/1 192/19 195/25 197/18 198/13 198/13 199/7 200/17 202/15 203/6 203/20 203/21 203/24 204/14</p> <p>what's [2] 147/9 199/16</p> <p>whatever [8] 86/9 89/11 111/18 166/10 180/23 181/15 198/21 206/14</p>	<p>when [67] 6/20 8/10 10/11 10/13 10/13 11/5 11/7 13/16 15/18 20/19 23/5 24/2 26/4 30/17 33/3 42/20 44/16 44/18 59/19 63/14 63/24 64/11 65/7 67/15 92/6 97/4 99/11 104/6 106/20 121/13 153/2 153/12 154/4 154/18 155/11 155/21 156/20 161/1 163/22 164/9 164/23 165/2 165/4 165/6 165/14 165/18 165/24 165/25 166/24 166/25 167/9 168/18 169/12 170/3 170/6 171/14 177/19 179/12 191/17 195/4 195/10 195/14 196/22 199/14 201/3 201/25 206/1</p> <p>whenever [1] 198/23</p> <p>where [36] 5/4 20/9 25/22 29/11 42/18 67/24 69/4 69/12 90/4 90/18 91/9 105/8 118/12 119/7 119/9 133/9 133/15 138/22 138/24 145/7 153/16 153/17 156/10 167/7 168/22 168/22 169/2 170/7 183/12 183/12 184/15 189/18 191/13 199/22 202/18 202/24</p> <p>whereof [1] 208/12</p> <p>Whereupon [4] 7/6 152/15 176/10 201/17</p> <p>wherever [1] 41/6</p> <p>whether [38] 8/8 40/8 41/12 43/18 46/5 48/25 58/11 60/17 62/3 62/21 73/14 76/18 77/7 78/15 83/22 83/23 84/7 84/18 84/23 84/23 88/11 104/7 104/8 104/13 112/22 113/7 113/15 122/5 123/8 137/13 155/19 161/16 177/23 179/21 179/21 181/21 189/9 203/15</p> <p>which [66] 16/10 19/11 23/10 23/14 24/22 24/23 26/1 26/5 26/7 26/23 26/23 28/8 29/16 32/21 32/22 33/10 35/14 36/7 36/22 45/5 47/9 50/4 50/19 58/10 58/21 65/20 71/24 74/18 74/20 77/9 77/25 78/5 81/3 90/3 93/15 101/10 104/12 106/16 107/13 109/3 113/1 114/5 117/17 120/24 120/24 121/5 124/7 128/12 136/1 136/2 136/23 137/4 137/18 137/21 142/7 142/8 146/13 159/3 166/4 173/14 178/21 188/4 191/14 198/12 202/22 204/13</p> <p>while [12] 26/25 53/12 53/15 61/9 72/14 86/16 96/17 105/2 115/3 127/11 179/21 198/15</p> <p>whispering [1] 89/4</p> <p>who [51] 5/20 6/10 17/13 17/18 18/3 18/6 29/7 57/16 57/19 57/19 57/25 62/2 62/3 62/5 62/12 63/7 69/24 81/13 90/3 90/12 90/17 91/12 91/23 93/12 94/4 94/18 100/18 103/20 106/15 121/11 125/2 139/4 139/10 144/6 145/12 147/23 148/1 150/18 156/18 164/1 173/13 173/16 175/9 183/10 191/24 192/7 192/16 196/17 197/22 200/21 207/9</p> <p>Who's [1] 92/17</p> <p>whole [5] 37/25 65/8 106/23 147/3 185/10</p> <p>wholly [1] 86/18</p> <p>whom [3] 84/10 84/23 138/23</p> <p>why [37] 16/8 23/20 37/23 38/22 39/4 39/18 39/20 40/17 45/3 47/18 48/3 55/18 56/16 56/17 56/17 61/21 69/22 78/15 78/16 79/15 102/22 119/4 119/4 141/2 144/7 147/12 151/18 153/21</p>	<p>154/11 157/20 170/11 170/22 175/19 184/6 187/9 191/21 195/18</p> <p>widespread [1] 30/4</p> <p>wife [3] 149/2 150/6 196/12</p> <p>will [37] 1/3 5/21 6/7 6/8 38/20 53/7 53/18 83/2 111/17 122/14 126/24 130/12 132/12 136/24 141/14 141/19 146/3 150/16 171/11 175/15 175/23 193/18 196/15 197/16 198/5 198/16 199/4 199/15 199/18 200/5 200/7 200/19 205/16 205/16 206/16 206/16 206/23</p> <p>WILLIAM [2] 2/13 2/18</p> <p>Williamson [1] 183/3</p> <p>willing [1] 6/2</p> <p>windows [4] 88/5 88/8 117/1 117/4</p> <p>wise [1] 110/3</p> <p>wish [2] 105/11 206/12</p> <p>wished [1] 111/6</p> <p>within [4] 12/5 107/17 147/13 167/16</p> <p>without [13] 13/1 17/14 42/11 53/25 54/3 67/2 67/13 105/11 112/1 121/8 130/19 155/18 196/13</p> <p>witness [32] 4/3 5/21 6/9 45/5 97/3 97/18 139/21 140/5 147/11 147/20 147/23 148/9 150/19 151/13 152/2 152/8 155/10 161/16 161/21 175/5 175/20 175/22 176/5 184/4 184/19 187/5 187/18 188/2 190/17 196/17 201/13 206/21</p> <p>witnesses [5] 149/17 151/21 197/2 197/2 205/22</p> <p>WL [2] 109/5 109/7</p> <p>woes [1] 130/19</p> <p>won't [5] 89/3 89/10 132/13 165/21 176/25</p> <p>word [1] 45/17</p> <p>words [1] 119/8</p> <p>work [22] 10/20 17/13 17/17 29/13 31/19 31/20 36/7 46/20 55/20 58/10 64/6 65/2 76/25 91/14 136/6 136/6 147/10 149/21 178/2 183/12 183/13 197/24</p> <p>worked [2] 50/23 86/25</p> <p>worker [4] 61/6 61/11 73/4 117/12</p> <p>workers [5] 30/25 53/3 72/10 116/6 158/1</p> <p>working [7] 29/20 54/17 70/13 91/18 108/7 170/8 171/14</p> <p>works [2] 63/9 183/10</p> <p>world [4] 46/4 57/1 57/16 103/22</p> <p>worn [1] 197/11</p> <p>worried [3] 165/20 167/23 168/4</p> <p>worry [2] 63/20 63/21</p> <p>worse [2] 15/25 16/4</p> <p>would [274]</p> <p>wouldn't [25] 11/18 16/19 17/13 26/24 27/1 28/11 28/23 29/8 59/17 64/23 65/11 67/3 68/4 71/12 71/17 75/2 76/23 88/1 98/18 123/2 147/12 151/18 166/10 174/21 188/5</p> <p>write [2] 13/18 75/20</p> <p>writing [4] 59/9 65/7 145/5 154/13</p> <p>written [5] 8/11 8/18 97/12 108/13 182/12</p> <p>wrong [9] 46/19 59/8 69/7 69/12 70/2 105/1 133/5 133/7 176/2</p> <p>wrongly [1] 133/7</p>
---	---	--

W**wrote [2]** 42/25 197/12**Y****yeah [24]** 6/5 40/1 65/23 82/19 84/3

140/17 142/16 142/22 145/23 147/22

148/5 164/13 165/22 166/9 168/16

168/17 169/5 169/14 169/25 171/11

172/20 174/23 182/15 192/11

year [5] 48/25 77/4 94/21 143/22 158/2**years [2]** 48/16 136/22**yes [283]****yesterday [38]** 5/13 7/16 7/21 10/5

11/13 12/16 14/22 18/7 19/16 27/11

34/1 34/20 41/4 46/25 50/6 50/15 50/21

60/20 72/12 73/20 75/19 89/15 92/6

98/5 98/16 99/15 101/5 101/13 108/6

112/6 119/21 125/15 126/7 126/19

129/22 130/2 192/12 197/16

yesterday's [1] 108/17**yet [11]** 49/1 49/4 78/1 87/1 97/11

124/9 126/15 187/23 199/17 203/15

206/18

York [1] 153/11**you [962]****you'll [2]** 159/9 162/18**you're [50]** 6/20 6/21 6/21 6/22 13/24

15/12 16/20 18/25 21/12 21/19 31/23

33/2 36/12 37/10 37/11 37/12 38/13

41/15 41/22 42/14 47/25 63/15 69/11

69/11 70/20 72/19 76/10 78/2 79/5 85/9

108/15 125/11 140/13 145/25 150/8

154/16 154/18 163/18 169/6 171/21

171/22 173/9 184/7 185/13 185/23

189/18 193/12 193/21 195/23 201/14

you've [17] 9/14 13/3 23/9 32/14 48/11

60/4 60/15 87/20 97/5 147/20 160/7

161/5 165/18 174/6 184/14 188/8 195/7

you-all [1] 83/9**youngest [1]** 52/1**your [340]****yourself [2]** 147/14 162/8**Z****Zaukar [1]** 109/6**zoom [5]** 115/12 124/11 149/6 158/19

175/9

zooming [1] 8/23