

STATE OF WISCONSIN

CIRCUIT COURT

DANE COUNTY

BRANCH 3

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In the Matter of the Recount of
Votes for President of the United
States:

JILL STEIN,
c/o Emery Celli Brinckerhoff &
Abady LLP
600 Fifth Avenue, 10th Floor
New York, NY 10020,

Case No. 16CV3060

Petitioner,

vs.

WISCONSIN ELECTIONS COMMISSION,
212 East Washington Avenue
Third Floor
Madison, WI 53707, and

Members of the Wisconsin Elections
Commission, each and only in his or
her official capacity:

MARK L. THOMSEN, ANN S. JACOBS,
BEVERLY GILL, JULIE M. GLANCEY,
STEVE KING, and DON M. MILLIS
212 East Washington Avenue
Third Floor
Madison, WI 53707,

Respondents.

* * * * *

PROCEEDINGS: HEARING

DATE: November 29, 2016

BEFORE: The Honorable VALERIE BAILEY-RIHN,
Circuit Court Judge, Branch 3, Presiding

APPEARANCES: Attorney CHRISTOPHER M. MEULER,
Freibert Finerty & St. John,
Two Plaza East, Suite 1250,
330 East Kilbourn Avenue,
Milwaukee, Wisconsin 53202,
appearing on behalf of the Petitioner.

APPEARANCES: (Con't)

Attorneys MATTHEW D. BRINCKERHOFF,
DEBBIE GREENBERGER and DAVID A. LEBOWITZ,
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Petitioner.

Assistant Attorneys General S. MICHAEL MURPHY,
COLIN ROTH, DAVID V. MEANY, ANDREW COOK, and
ANTHONY RUSSAMANNO,
Wisconsin Department of Justice,
17 West Main Street,
PO Box 7857,
Madison, Wisconsin 53707,
appearing on behalf of the Respondents.

MICHAEL HAAS,
Wisconsin Election Commission,
Madison, Wisconsin, appearing in proper
person.

Attorneys JOSHUA L. KAUL and
CHARLES G. CURTIS, JR.,
Perkins Coie,
One East Main Street, Suite 201,
Madison, Wisconsin 53703,
appearing on behalf of the Intervenor
Secretary Hillary Clinton.

REPORTER: Melanie Olsen
Official Reporter

* * *

1 November 29, 2016

2 P R O C E E D I N G S

3 THE COURT: We'll call the case. Go
4 ahead and call the case, and then I'll ask
5 for the appearances.

6 THE CLERK: Calling the case of Jill
7 Stein versus Wisconsin Elections Commission,
8 et al., case number 16CV3060. Appearances,
9 please.

10 MR. MEULER: Good afternoon, your
11 Honor. Christopher Meuler from Freibert,
12 Finerty & St. John appearing on behalf of the
13 petitioner. With me at counsel table is
14 Matthew Brinckerhoff and Debra Greenberger
15 and also right behind us is David Lebowitz.
16 All three, I believe, by your order this
17 morning were admitted pro hac vice, and we
18 thank you for the quick speed with which you
19 handled that.

20 THE COURT: Thank you.

21 MR. MURPHY: Your Honor, for the
22 respondents, I'm Mike Murphy from the
23 Wisconsin Department of Justice. At counsel
24 table with me is Colin Roth and Dave Meany.
25 In the row behind me is Attorney Andy Cook,

1 Mike Haas, the administrator of the Wisconsin
2 Election Commission, and Attorney Anthony
3 Russamanno. And we thank you for finding
4 time this afternoon to hear this matter.

5 THE COURT: Thank you.

6 MR. KAUL: Your Honor, on behalf of
7 the Intervenor, Secretary Hillary Clinton,
8 I'm Josh Kaul. I'm joined at counsel table
9 by Chuck Curtis.

10 THE COURT: Okay. So, we have some
11 outstanding motions. One is the motion to
12 intervene. I am going to grant that, unless
13 anybody needs to argue it.

14 MR. MURPHY: No.

15 THE COURT: Okay. So I will grant
16 that.

17 I will also grant the motion of pro
18 hac vice of Mark Elias, and I've signed that.

19 Is there any outstanding motions that
20 I have not addressed? I did the pro hac, the
21 other ones, earlier this morning.

22 Okay. Great. Thank you.

23 So, we're here today on an expedited
24 basis. I have in fact read all the
25 affidavits, I've read all the briefs, and I

1 have taken a look at the statutory authority
2 for this proceeding. And obviously the court
3 is required to hear this as expeditiously as
4 possible. That's why we're having it for
5 4:30 tonight. I apologize for the lateness
6 of the hour, but we need to get this
7 resolved.

8 So, it is the petitioner's petition,
9 so unless there is any more preliminary
10 information that we need to address, let's
11 get started.

12 We will need -- I'm assuming we're
13 going to have an evidentiary hearing on this.

14 MR. BRINCKERHOFF: Yes. We are
15 prepared to proceed. There is one slight
16 complication. And we're happy to go right
17 into the evidence if that is the Court's
18 preference, but we were only able to get one
19 witness here live. He's flown in from
20 Ann Arbor. He landed about 20 minutes ago.
21 We expect him to be here quite soon.

22 And I guess I have almost a
23 housekeeping question, which is, we obviously
24 want to do whatever we can to help the Court
25 make a determination in this case, and if the

1 Court wants to hear argument or has questions
2 or any of that sort, we're obviously here and
3 happy to entertain any of those things. But
4 if we had our druthers, we would prefer to
5 start with our first witness live as we think
6 he'll be here momentarily. But we can also
7 -- the other ones, we had made a call earlier
8 today to inquire about the possibility of
9 telephonic testimony, and we have witnesses
10 prepared or standing by to provide that
11 testimony.

12 And one other thing that -- I was a
13 little uncertain about whether or not the
14 Court would be interested in entertaining
15 evidence of this sort. I'm happy to hear
16 that the Court is. But I think there might
17 be some opportunities for some stipulations,
18 for instance, qualifying people as experts,
19 things of that sort that could speed this up,
20 and I had not yet had a chance to confer with
21 any of the counsel for their respective
22 parties to this action.

23 So, I'm just trying to figure out the
24 best way to proceed efficiently and
25 expeditiously.

1 THE COURT: Thank you. I do believe
2 that we will need live testimony. Obviously,
3 I can't decide on affidavits. I need to hear
4 the evidence. But maybe while we're waiting
5 for your first live witness, we have granted
6 approval to have witnesses appear by phone,
7 so we could always take those. But before we
8 get that far, maybe we should talk about the
9 stipulations regarding the qualifications.

10 Does the Wisconsin Election Commission
11 have any concerns about the qualifications of
12 the proposed -- well, who are your witnesses?
13 I guess that's the first question.

14 MR. BRINCKERHOFF: The first witness
15 who's attempting to get here in person is
16 J. Alex Halderman. He's a computer science
17 professor at the University of Michigan.
18 Obviously, we've submitted an affidavit on
19 his behalf in two places but with the
20 petition as well as with the -- I mean,
21 sorry, the petition before the Wisconsin
22 Election Commission and the petition before
23 the Court.

24 The next witness after that that we
25 would like to call is Professor Philip Stark

1 who would be appearing by telephone. He is
2 basically a statistics professor.

3 All of our experts have specialized
4 expertise in voting issues, irregularities,
5 integrity, and the like. But Professor
6 Halderman is a computer scientist, Professor
7 Stark is a statistician, and then we can keep
8 rolling beyond that, depending of course also
9 on the time that we have with the Court and
10 perhaps some other issues. But we want to at
11 least start with those two.

12 THE COURT: Okay. And any response to
13 that?

14 MR. MURPHY: Your Honor, I've reviewed
15 the CVs all of these people. They certainly
16 have some academic qualifications. I think
17 we'd -- I think a blanket stipulation we
18 can't do without knowing a little bit more
19 about what they're testifying to and how that
20 fits into their expertise.

21 THE COURT: Okay. You want to respond
22 to that?

23 MR. BRINCKERHOFF: For the record, we
24 are planning for the most part to keep their
25 testimony essentially within the bounds of

1 the affidavits that have already been
2 submitted. There might be a little bit of
3 rebuttal to the papers that we received this
4 afternoon at a little bit after 1 o'clock.
5 But beyond that, it wouldn't go past that.

6 I'm happy to have -- these experts are
7 incredibly well-credentialed and world
8 renowned in their field, so I'm happy to have
9 them explain all of that to the Court. I
10 just thought for efficiency purposes, I
11 didn't imagine -- and I'll be more specific
12 -- that anyone would necessarily object to,
13 for instance, qualifying Professor Halderman
14 as an expert in computer science and
15 electronic voting security.

16 MR. MURPHY: We can stipulate to the
17 qualifications but not the relevance, your
18 Honor. If we're going to have computer
19 scientists testifying about Russia, that's
20 another matter. But to their qualifications
21 in their field, we have no objection.

22 THE COURT: That's fine. Then we'll
23 take it as it comes.

24 At this point, is there any other
25 housekeeping we need before -- and you're

1 still waiting for your first witness.

2 MR. BRINCKERHOFF: Yes. We could
3 start with Professor Stark and try to set up
4 the phone call. Or we could also try to
5 contact him right now and just see how close
6 he is to being here, only because it's
7 conceivable we could set up the phone call
8 and then he's here.

9 THE COURT: Okay. Why don't you have
10 one of your colleagues call him and find out.

11 In the meanwhile, we do have as long
12 as we need tonight to the point where we can
13 stay awake, and then we have cleared the
14 decks for tomorrow as well. I know that's
15 not optimal for the Elections Commission, but
16 that is a possibility if we need to continue
17 over to tomorrow. So, we'll see where we go
18 tonight.

19 MR. BRINCKERHOFF: Thank you very
20 much, your Honor. We're committed to trying
21 to keep this moving as quickly as possible,
22 and we're certainly hopeful that we can
23 finish it tonight, because obviously it will
24 be a lot for you to consider in making your
25 determination. And the good news is that

1 Mr. Halderman is here, he's in the building,
2 and he should be here any minute.

3 THE COURT: Okay. Good.

4 MR. BRINCKERHOFF: So I'm prepared to
5 call him as soon as he arrives.

6 THE CLERK: Right here is fine.
7 That's fine. Raise your right hand.

8
9 J. ALEX HALDERMAN,
10 called as a witness, being first duly sworn,
11 testified on oath as follows:
12

13 THE CLERK: Thank you. Go ahead and
14 have a seat. The chair does not move; the
15 microphone does.

16 MR. BRINCKERHOFF: May I proceed?

17 THE COURT: Yes, you may.
18

19 DIRECT EXAMINATION

20 By Mr. Brinckerhoff:

21 Q. Good afternoon, Professor Halderman.

22 MR. BRINCKERHOFF: (Unintelligible.)

23 THE CLERK: No, you ask his name. Ask
24 him to spell it for the court reporter,
25 please. And also, you'll want to make sure

1 that you use your microphone as it won't pick
2 up if you're not speaking into the
3 microphone.

4 MR. BRINCKERHOFF: Thank you very
5 much.

6 THE COURT: You have a soft voice so
7 you may want to get a little bit closer. The
8 microphone does move closer to you so you
9 might want to --

10 MR. BRINCKERHOFF: I'm actually not
11 known for my soft voice, so I'm quite
12 confident I can make up for that.

13 THE COURT: All right. Okay.

14 Q. Good afternoon, Professor Halderman. Could you
15 please state your full name for the record.

16 A. My full name is John Alexander Halderman, J-O-H-N,
17 A-L-E-X-A-N-D-E-R, H-A-L-D-E-R-M-A-N. Although, I
18 abbreviate it J, period, Alex, A-L-E-X.

19 Q. Could you tell me what your current employment is.

20 A. I'm a professor of computer science and engineering at
21 the University of Michigan and the director of Michigan
22 Center for Computer Security and Society.

23 Q. And do you have any particular areas of expertise?

24 A. I am an expert in computer security, network security,
25 and the security of electronic voting systems.

1 Q. And do you have any specific expertise as it relates
2 -- I'm sorry, you said voting systems. Can you tell
3 me what kind of expertise you have when it comes to
4 security with voting systems?

5 A. I have extensively studied the kinds of electronic
6 voting machines and voting systems that are used in the
7 United States and other countries including ways in
8 which they might be compromised by attackers as well as
9 methods for improving their security.

10 MR. BRINCKERHOFF: And I believe we
11 have a stipulation, but for the record, I
12 would ask the Court to recognize Professor
13 Halderman as an expert in the areas of
14 computer science and specifically in voting
15 security, election security.

16 THE COURT: Any objection?

17 MR. MURPHY: No objection.

18 THE COURT: So noted.

19 Q. Professor Halderman, do you have any experience or
20 knowledge with voting machines that are typically
21 called optical scanning or optical scanners or Opscan
22 machines?

23 A. Yes, I do.

24 Q. And in the work -- have you ever done any work or
25 testing on these kinds of machines?

1 A. I've been involved in studies sponsored by governments
2 including the California Top-to-Bottom Review that did
3 examine optical scan voting machine security.

4 Q. And are there any kinds of security problems just in
5 general that you're aware of or have identified or
6 become familiar with in the years that you've been
7 working in this area?

8 A. Yes. Optical scan voting machines are computers. Just
9 like other computers, they are subject to security
10 problems. Somebody who attempted to hack into an
11 optical scan voting machine could change the way that
12 it functions to cause it to count votes incorrectly and
13 produce any outcome that they wanted.

14 Q. And as I think you may know, have you had an
15 opportunity to review any of the affidavits or
16 materials that were submitted by the Wisconsin
17 Elections Commission earlier today?

18 A. Yes. Very briefly.

19 Q. Understood. But based on that brief review, do you
20 have any opinion about whether or not the safeguards
21 that are in place in Wisconsin to prevent some kind
22 of outside cyber interference with optical scanning
23 machines specifically gives you any degree of comfort
24 that they are secure?

25 A. My understanding is that those safeguards include

1 pre-election testing, they include tamper evidence
2 seals, and those are not effective at preventing cyber
3 attack against voting systems. We know from extensive
4 research that seals and pre-election testing can be
5 completely bypassed by attacks on the machines.

6 Q. Let's start with the seal. Can you describe for me
7 what the sealing security measure is and why it can
8 be bypassed in the way that you just described?

9 A. So a tampered evidence seal is supposed to show that a
10 voting machine has not been physically tampered with.
11 Unfortunately, in research that's been conducted over
12 the past 10 years, security experts have demonstrated
13 that the kinds of tamper evidence seals typically used
14 on voting machines are easy to bypass by an attacker
15 with simple and readily available tools. And by
16 bypassing them, you can tamper with the voting machine
17 without leaving evidence that's going to be detected
18 when the seals are checked as part of normal election
19 procedures.

20 Q. And insofar as you can, what kind of available tools
21 are you referring to when you say specifically the
22 kinds of tools that could be used to bypass the seal?

23 A. Well, depending on the kind of seal, it might be
24 something as simple as a screwdriver or a hair dryer
25 that can be used to loosen the seal or remove it in a

1 particular way without leaving evidence of tampering.

2 Q. And if there is no attempt to compromise the
3 integrity of the voting machines by physical means
4 that might be revealed in a seal but might not in the
5 way that you described, are there other methods
6 available to someone to try to change the potential
7 outcome of the vote tally?

8 A. Yes. And unfortunately, physical access is not
9 required to tamper with optical scan machines and other
10 kinds of voting machines. Even though they may not be
11 connected to the Internet directly, these machines
12 receive software updates, they receive ballot
13 programming from other equipment either at the offices
14 of a county government or perhaps at a company that
15 provides services to the county. Those other systems
16 may be connected to the Internet or may be attacked in
17 other ways. And once those systems used to program the
18 voting machines are compromised by an attacker, the
19 attack can spread on the removable media that's used to
20 configure the voting machines into the machines
21 themselves, and that requires no compromise of any
22 seals.

23 Q. And are you familiar with whether or not the State of
24 Wisconsin and specifically the Wisconsin Election
25 Commission has any private company vendors that do

1 any of the operating of the voting equipment on
2 election day?

3 A. Yes. Based on material that I've reviewed, there are
4 examples of companies that service a thousand or more
5 different polling locations in Wisconsin, and the worry
6 would be in my mind that that company if compromised
7 could be used to spread an attack to all of the poll
8 sites that it services.

9 Q. Now, one of the other things in addition to the seal
10 that you mentioned is that there's a certain amount
11 of testing that is done of optical scan machines
12 leading up to their use on election day, correct?

13 A. That's correct.

14 Q. And what kind of problems arise, if any, in the
15 effectiveness of that particular technique?

16 A. The pre-election testing requirements in Wisconsin and
17 other states are designed to demonstrate the logic and
18 accuracy of the machine is functioning correctly. That
19 is, the ballot has been set up properly and mechanical
20 factors like that. It's not designed and does not
21 function to detect cyber attack against the machines.

22 The logic and accuracy test can be defeated by
23 malicious attacks in a number of different ways,
24 including by having the attack only function if the
25 machine has counted a large number of votes, larger

1 than the number that are tested in pre-election
2 testing, or perhaps by setting the time at which the
3 attack will function to be towards the close of polls
4 rather than prior to the opening of polls when the
5 logic and accuracy tests are performed.

6 Q. And, Professor Halderman, have you yourself ever
7 attempted to, to use a colloquial term, hack into a
8 voting Opscan machine to attempt to alter the way it
9 would operate?

10 A. I myself have been involved in studies that have
11 demonstrated the vulnerability of Opscan machines
12 including the California Top-to-Bottom Review. I have
13 in my own work constructed a tax against DRE voting
14 machines that would function similarly in this the way
15 of an -- similar to the way an attack on Opscan
16 machines would function, by spreading in the form of a
17 voting machine virus from one point of infection to
18 many machines.

19 Q. And is there a difference between a virus and what
20 sometimes is referred to as malware?

21 A. A virus is one form of malware. In this case, a virus
22 is a form of malware that can spread to machines
23 sometimes not connected to the Internet by colloquially
24 hitching a ride on the memory cards that are used to
25 program the voting machines on election day.

1 Q. Just so I understand specifically what you mean, when
2 you say "hitching a ride," what is happening
3 physically if there's malware or a virus that's
4 infected a computer system at a manufacturer or at
5 the primary computer base for an election system
6 within a state. How does it exactly hitch its ride
7 to these individual machines?

8 A. The malware -- the specifics would depend on the
9 particular voting system involved, but in general, the
10 malware would modify or add files to the memory card
11 that would cause the voting machine to malfunction in a
12 way that it miscounted votes. For certain kinds of
13 voting machines we know that the malware on the memory
14 card can modify the programming inside the voting
15 machines in a persistent and potentially undetectable
16 way.

17 Q. Professor Halderman, I think you are familiar with
18 the fact that one of the issues presented today in
19 this case is whether or not there's an important
20 distinction between recounting ballots by hand and
21 tabulating them by hand versus basically running the
22 same ballots through the machines after they've been
23 reprogrammed. Do you have an opinion as to whether
24 or not that reprogramming will ensure that none of
25 the kinds of things that you have testified about

1 thus far would reoccur?

2 MR. MURPHY: I'm going to object on
3 foundation and relevance. Without knowing or
4 having foundation on the way Wisconsin does
5 that, I don't think he can competently answer
6 that question.

7 Q. Professor Halderman, if you accept hypothetically
8 that an Opscan machine is completely reprogrammed
9 from the start for the same election, is there any
10 way in your professional -- I'm sorry, expert opinion
11 that that hacker or some kind of person bent on
12 infecting that machine could accomplish that a second
13 time?

14 A. Well, yes. The same vulnerabilities that were present
15 on election day continue to exist in the voting
16 machines because they are the same technology, the same
17 model, and for that reason the machines are just as
18 subject to hacking now as they would have been prior to
19 the election.

20 Q. And is there any possibility that if you posit that
21 someone had initially gotten malware or a virus to
22 hitch a ride into one or more Opscan machines, that
23 it could remain there in some way and affect further
24 operation even if it is subject to some kind of
25 reprogramming with new memory cards and the like?

1 A. Yes. Because some of the programming in a voting
2 machine as a computer is persistent programming. It
3 doesn't exist on the memory card. It's in the firmware
4 inside the device. And as I have shown in my research
5 on certain models of voting machines, we can
6 persistently reprogram that firmware to cause the
7 machine to continue to be dishonest to cause fraudulent
8 results in future elections or recounts.

9 Q. And do you have an opinion based on your testimony
10 thus far of what kind of a recount would be most
11 reliable, a hand recount where the ballots are
12 examined by human eyes and hand tabulated, or a
13 rescan through the same machines with a new program?

14 A. I strongly am of the opinion that a hand recount is
15 going to provide a more accurate result because it will
16 not be affected by any kind of cyber security attack
17 that might be compromising the scanning machines.

18 Q. And so, is it true then that you're confident that if
19 -- that in any of the jurisdictions in Wisconsin
20 where there is a hand recount and not rerun through
21 the machines that those tallies should be accurate?

22 A. I believe that those tallies should be accurate. The
23 optical scan ballots used in Wisconsin are --

24 MR. MURPHY: Object to foundation
25 here.

1 THE COURT: Any --

2 Q. Professor --

3 MR. BRINCKERHOFF: May I -- I can try
4 to --

5 THE COURT: Sure.

6 MR. BRINCKERHOFF: I think I
7 understand the objection.

8 Q. Professor Halderman, are you familiar with the types
9 of optical scanning machines that are used in
10 Wisconsin?

11 A. Yes, I am.

12 Q. And based on that familiarity, can you tell me --

13 MR. BRINCKERHOFF: I'm sorry. Can I
14 have the question read back that I had the
15 objection to? Is that possible? Or is that
16 too burdensome? If so, I'll just try to move
17 forward.

18 (Question page 21, lines 14 through 17 read back.)

19 THE COURT: Thank you so much. I'm
20 sorry to burden you with that.

21 Q. Professor Halderman, you testified already that
22 you're confident that the hand re-tally will be
23 accurate, correct?

24 A. Yes.

25 Q. And I believe that my next question was are you

1 confident that a rerun through the machines will be
2 accurate?

3 A. Oh, that a rerun through the machines will be accurate.
4 I am not confident that a rerun through the machines
5 will be accurate.

6 Q. And that is based, as I understand your testimony
7 thus far, on your familiarity with the kind of
8 machines, optical scanning machines, that are used in
9 Wisconsin?

10 A. Yes. Optical scan machines have been demonstrated in
11 research to suffer from a wide variety of not only
12 security problems but also problems with their
13 accuracy.

14 Q. And, Professor Halderman, is there anything about
15 this particular election cycle that leads you to have
16 any specific concerns about cyber security when it
17 comes to the integrity of the election systems within
18 the United States at large?

19 A. Yes. I'm concerned because in this election cycle
20 we've seen unprecedented cyber attacks that the federal
21 authorities have linked to foreign government that
22 appear to have been aimed at interfering with the
23 course of the election.

24 Q. And what are the nature of those attempts and/or
25 breaches, cyber security breaches, that you're

1 referring to leading up to the election specifically?

2 A. These include attacks on the e-mail system of the
3 Democratic National Committee, the e-mail of John
4 Podesta, the Hillary Clinton campaign manager, and
5 include attacks aimed at the voter registration systems
6 of two states, Illinois and Arizona, as well as attacks
7 that reportedly were attempts to infiltrate election
8 systems in I believe it was 20 other states that's been
9 reported.

10 Q. And are you aware of any such attempted attacks and
11 successful attacks on election-related machinery
12 prior to the 2016 Presidential election cycle?

13 A. Prior to -- can you clarify the question.

14 Q. At least within the United States, have there been
15 other attacks that you're aware of or attempted
16 attacks specifically targeted at election-related
17 activities, whether it's a campaign or election
18 official websites and the sorts of attacks that you
19 just described?

20 A. These are, to my knowledge, a pattern of attacks and
21 especially one linked to foreign government that does
22 not have precedent in an American Presidential
23 election.

24 Q. And do you have any familiarity of any attempted or
25 successful types of cyber attacks into elections in

1 other countries in the world?

2 A. In the 2014 election in Ukraine, there was, according
3 to published reports, an attack that targeted the
4 election infrastructure --

5 MR. MURPHY: Objection to foundation,
6 your Honor.

7 THE COURT: I'll sustain it.

8 Q. Professor Halderman, based on the nature of the
9 attacks that you described within the United States,
10 do you have any opinion about the sophistication or
11 abilities of the person or persons who carried out
12 one or more of those attacks?

13 A. My opinion is that the pattern of attacks that we've
14 seen follows the mode of operations commonly associated
15 with nation-state style attackers, foreign states, and
16 their cyber military capabilities. These capabilities
17 are among the most powerful threats known to computer
18 security.

19 Q. And why is it that they are in that rarified category
20 that you just described?

21 A. Nation-states in their cyber offensive capabilities
22 often target very well-hardened and secured systems and
23 yet have methods of breaching them, such as what we
24 call jumping an air gap or targeting, which means
25 targeting systems that are not directly connected to

1 the Internet.

2 Q. And can you tell me what an air gap is, please.

3 A. An air gap simply means that a computer or other device
4 isn't directly networked to Internet connected devices
5 or other systems that might be attacked. Instead,
6 there's some kind of physical disconnection between the
7 systems.

8 Q. And I'm sorry to jump a little bit around, but when
9 we go back to the hand tabulating or hand counting of
10 the vote, I know that you testified that you believe
11 that that would be accurate and reliable. Do you
12 have any opinion about any risk of human error in
13 that kind of compilation?

14 A. Human error in the hand tabulation of the vote?

15 Q. Yes.

16 A. My opinion is that the risk of human error in hand
17 tabulation is low.

18 Q. And why is that?

19 A. In hand tabulation of a single race, the procedures in
20 Wisconsin call for ballots to be sorted by the chosen
21 candidate and then the number of ballots for each
22 candidate to be counted. These are simple and
23 straightforward steps.

24 Q. And is there any opportunity in that kind of method
25 of recount for someone to electronically through

1 malware or any of these kinds of activities influence
2 the outcome or the tallies of the vote?

3 A. No. And that is the very point of having a paper
4 record is this provides a very strong defense against
5 attempts to manipulate the election outcome through
6 cyber attack because the paper itself obviously is a
7 physical record, cannot be changed by cyber attack
8 after the votes have been cast.

9 Q. And thus, that paper record ends up being the most
10 reliable indicator of the intent of all of the
11 voters?

12 A. That is my opinion.

13 Q. Okay. And is there anything about the state of
14 Wisconsin in this election cycle that you believe
15 makes it more vulnerable or likely to be targeted by
16 potential cyber attackers of the sort that were
17 confirmed leading up to the election?

18 A. Wisconsin was among the states that were predicted to
19 have very close races in the Presidential election. An
20 attacker planning to commit an attack that would
21 disrupt or change the outcome of the Presidential
22 election would logically want to target the close
23 states just because those are the place where an attack
24 would likely have the most probability of effecting the
25 overall outcome.

1 Q. But isn't it also true that as long as you change
2 enough votes, you could change the outcome of a vote
3 in a state that was not prognosticated to be as close
4 as Wisconsin.

5 A. That's true, but the more votes you change, the more
6 likely the attack would be to cause people to be
7 suspicious. So thinking in the role of an attacker,
8 the best strategy is to attack the states that are
9 predicted to be as close -- to be the closest.

10 MR. BRINCKERHOFF: Just one moment
11 please. I have no further questions.

12 THE COURT: Thank you. Cross?

13 MR. MURPHY: Yes, your Honor.

14
15 CROSS-EXAMINATION

16 By Mr. Murphy:

17 Q. In your testimony today and your affidavit, you've
18 not identified any specific attack on a Wisconsin
19 vote tabulation machine, right?

20 A. I have not.

21 Q. And you've not identified any instance of a Wisconsin
22 vote tabulation machine being compromised, right?

23 A. That is true, though the evidence of that would come
24 from the paper record and by comparing that to the
25 digital record.

1 Q. And you're not aware of any malware currently on a
2 Wisconsin election tabulation machine?

3 A. I don't know of any malware presently on the machines,
4 but the evidence of the malware would come from
5 inspecting the paper ballots.

6 Q. And you don't know what kind of seals are used in
7 Wisconsin, right, on the machines?

8 A. I don't know the -- I know the types of seals that are
9 typically used in election systems in the United
10 States.

11 Q. So that's a no; you don't know what types are used in
12 Wisconsin. Right? I'm sorry --

13 A. I do not know which types --

14 Q. Okay. Thank you. I'm sorry. I was kind of all
15 there.

16 And you've not physically reviewed or
17 investigated any of Wisconsin's machines or the
18 security procedures used in this election; is that
19 right?

20 A. Yes, I have investigated some of the electronic voting
21 machines used in Wisconsin.

22 Q. In Wisconsin?

23 A. I haven't conducted the investigations within the
24 borders of Wisconsin.

25 Q. So you haven't conducted any that have been tested by

1 the Wisconsin Election Commission.

2 A. I have tested some of the models of voting machines
3 that have been -- that are used in Wisconsin.

4 Q. The question is not models; the question is machines.

5 A. Of the individual machines, no, I have not.

6 Q. Thank you. And you're not aware of any malware on
7 election tabulation machines in Wisconsin that would
8 affect a recount in the way that you described would
9 be possible.

10 A. I'm not aware of such malware, although, such malware
11 could certainly be constructed.

12 Q. I believe you testified that a hand comparison
13 between the ballots fed into a machine and the output
14 of the machine would establish whether the machine
15 was counting correctly, right?

16 A. A hand comparison, excuse me, between the ballots that
17 are fed in and the count that it --

18 Q. Uh-huh.

19 A. No. I testified that a hand recount would reveal
20 whether the machines were functioning correctly.

21 Q. Okay. So a hand recount, meaning you look at the
22 ballots that were fed through the machines -- I
23 understand the distinction.

24 Would a comparison between the ballots that
25 were fed through a machine and the output of the

1 machine based on those ballots tell you whether the
2 counting had integrity?

3 A. No, necessarily. It depends on, for instance, the size
4 of the count.

5 Q. Okay. So comparing the output from the actual
6 ballots would not let you know if the machine was
7 counting correctly. Is that your testimony?

8 A. Comparing counting the votes -- counting the ballots by
9 hand --

10 Q. Uh-huh.

11 A. -- right? Counting the ballots by hand and comparing
12 them at scale to the output of the machines on election
13 day would tell you whether the machines had been
14 counting correctly.

15 Q. Thank you. You've written articles about the
16 integrity of the 2016 general election, right?

17 A. Yes.

18 Q. And you concluded and publicly stated that deviations
19 between election poll results -- election -- excuse
20 me.

21 And you've concluded and stated publically
22 that deviations between elections and polls was
23 probably not the result of a cyber attack, right?

24 A. Probably not.

25 Q. And you believe the more likely explanation is that

1 the polls were systematically wrong, right?

2 A. I think that's correct, although, I don't think the
3 cyber attack is orders of magnitude less likely than
4 the deviation from the polls.

5 Q. It's fair to say that your testimony here about the
6 dangers and hazards are about possible problems with
7 Wisconsin voting machines and not what has actually
8 happened as far as you're aware, right?

9 A. I consider vulnerabilities of this magnitude to be an
10 actual problem with the Wisconsin voting machines.

11 Q. But we went through a number of questions where you
12 don't have any evidence of any of those problems
13 occurring in Wisconsin, right?

14 A. If the problems occurred in Wisconsin, it is possible
15 that the only evidence will be on the paper ballots and
16 will only be detected if a hand count is performed.

17 MR. MURPHY: Nothing further. Thank
18 you.

19 THE COURT: Thank you. Attorney
20 Curtis or Attorney Kaul?

21 MR. KAUL: No questions, your Honor.

22 THE COURT: Any redirect?

23 MR. BRINCKERHOFF: Yes, please.
24
25

REDIRECT EXAMINATION

By Mr. Brinckerhoff:

Q. Professor Halderman, have you been provided any opportunity to inspect any of the machines that were used by Wisconsin in the 2016 Presidential election?

A. No, I have not.

Q. Would you be willing to conduct such an inspection?

A. Yes, I would.

Q. And if you inspected any -- I'm sorry, that the machinery of this election, would you be able to conclude definitively whether or not there was some kind of cyber attack that affected the outcome of the election here in Wisconsin?

A. I cannot say for sure without performing such an inspection, but such an inspection would have a significant likelihood of revealing the presence of such a cyber attack if one had been conducted.

Q. And so inspection would be one way to determine or rule out the potential of some kind of cyber interference that is not a hundred percent guaranteed to detect it. The method, as I understand your testimony, to be confident that such a thing is detected is hand counting every ballot?

A. Yes.

Q. Now, you were questioned about the types of seals.

1 Are there any kinds of seals, given the nature of
2 what a seal does, that you're aware of that in any
3 way prevents the kind of malware "hitching a ride"
4 that you've testified to earlier?

5 A. No. I am not aware of any seal that could do such a
6 thing, and seals are essentially irrelevant to that
7 kind of malware.

8 Q. And a moment ago you were asked questions about
9 comparing ballots to the count on a machine and your
10 answer referenced the scale of that comparison,
11 correct?

12 A. That's right.

13 Q. And can you tell me what you meant by scale?

14 A. It means how many ballots are being recounted. A
15 recount that -- a hand count -- scanning a small number
16 of ballots as in pre-election tests and comparing the
17 machine's output to what's actually on the ballots
18 could be defeated. That's not the same as performing a
19 hand count of the election, which is the best method we
20 have of determining whether a cyber attack influenced
21 the outcome.

22 Q. And how could the smaller subset pre-election type of
23 test be defeated as you've just said?

24 A. Malware might be programmed, for instance, not to cheat
25 unless a large number of ballots were being counted as

1 the number found in a typical polling place.

2 MR. BRINCKERHOFF: I have no further
3 questions.

4 THE COURT: Any recross?

5 MR. MURPHY: Very briefly.

6

7 RECROSS-EXAMINATION

8 By Mr. Murphy:

9 Q. I understand your testimony and opinion to be that
10 the only way to know if the outcome of an election in
11 a particular state reflects the balance is to do a
12 hand recount; is that right? It's the only way to
13 know?

14 A. Is to inspect the physical evidence --

15 Q. The physical ballot --

16 A. -- when possible, such as a hand recount, yes.

17 Q. So was it your opinion that a hand recount should be
18 conducted in every state that was predicted to be
19 close in the 2016 general election?

20 A. Yes. I believe that a hand recount is -- or other
21 methods of determining to high statistical confidence
22 that the physical record matches the digital record are
23 necessary as a routine matter of election security.

24 MR. MURPHY: Nothing further. Thank
25 you.

1 THE COURT: Counsel, I have a couple
2 questions. Do you mind if I ask them? I
3 won't if anybody objects.

4 MR. BRINCKERHOFF: No, your Honor. We
5 very much welcome that. Obviously, you are
6 the fact finder. We want to accommodate you
7 in all respects.

8 THE COURT: Okay.

9

10 EXAMINATION

11 By the Court:

12 Q. Sir, there is some indication that after the election
13 there are some audits performed by the Wisconsin
14 Election Commission on some of the ballot machines to
15 ensure that they -- they do hand counts against some
16 of the ballot machines to make sure that there is not
17 an issue. Do you have an opinion as to whether that
18 is sufficient?

19 A. My opinion is that that is insufficient, because the
20 kinds of audits that are conducted in Wisconsin, is my
21 understanding, audit a fixed number of poll sites,
22 which is not necessarily sufficient to establish with
23 high statistical confidence the outcome -- that the
24 outcome was correct if the outcome was close, as it was
25 in this election.

1 Q. What is your opinion as to what sort of hand counting
2 of the ballots -- what percentage of the Wisconsin
3 polling places -- what would in your mind be
4 sufficient to determine whether or not there were any
5 concerns with the balloting process?

6 A. A larger, random sample of polling places could be
7 sufficient, but how large would need to be calculated
8 by statisticians, and I have not done the calculation.

9 THE COURT: Thank you. I have no
10 further questions.

11 MR. BRINCKERHOFF: Just one followup

12 --

13 THE COURT: Sure.

14 MR. BRINCKERHOFF: -- because I think
15 it's pertinent to his answer to that
16 question.

17
18 FURTHER REDIRECT EXAMINATION

19 By Mr. Brinckerhoff:

20 Q. Why is it that it would have to be a random sample?

21 A. The necessity of a random sample is that if it is not a
22 random sample, say, some particular counties choose one
23 method or the other, it's possible that an attack would
24 be designed to target only counties that were likely to
25 use a machine count. It's also possible that -- it's

1 also much harder to estimate the number of ballots that
2 need to be counted in a nonrandom sample that would
3 need to be counted by hand in order to gain high
4 statistical confidence.

5 MR. BRINCKERHOFF: Thank you.

6 THE COURT: Thank you. Any further
7 cross?

8 MR. MURPHY: Very briefly.

9
10 FURTHER RECROSS-EXAMINATION

11 By Mr. Murphy:

12 Q. Are you aware of how Wisconsin selects its samples
13 for auditing?

14 A. I understand that Wisconsin selects a random sample of
15 a hundred poll sites --

16 Q. Thank you.

17 A. -- which is too small for high statistical confidence.

18 MR. MURPHY: Nothing further.

19 THE COURT: Okay. Anything further?

20 MR. KAUL: No, your Honor.

21 THE COURT: All right. You may step
22 down. Thank you.

23 THE WITNESS: Thank you.

24 MR. BRINCKERHOFF: Our next witness is
25 Professor Philip Stark, who we will need to

1 contact by telephone.

2 THE COURT: Okay.

3 (Phone call is made.)

4 MR. STARK: Hello?

5 THE COURT: Professor Stark, this is
6 Judge Bailey-Rihn. How are you?

7 MR. STARK: Fine, your Honor. How are
8 you?

9 THE COURT: Good. You are going to be
10 sworn in, and then I believe your counsel is
11 going to ask you some questions followed by
12 some cross examination. So, you want to
13 raise your right hand.

14 MR. STARK: It's up.

15 THE COURT: Okay.

16

17 PHILIP B. STARK,

18 called as a witness, being first duly sworn,
19 testified on oath as follows:

20

21 THE CLERK: Thank you.

22 THE COURT: Thank you. You may
23 proceed.

24

25

DIRECT EXAMINATION

By Ms. Greenberger:

Q. Good afternoon, Professor Stark. Can you state your full name for the record.

A. Philip Bradford Stark.

Q. And can you spell your last name, please.

A. S-T-A-R-K.

THE COURT: Wait one second. You're pretty quiet. We're having trouble hearing you, and I need to have a legible record so my court reporter can get everything down.

THE WITNESS: Okay. Is this better?

THE COURT: Yes.

Is it better? Okay.

Yes.

Q. And what is your current employment, Professor Stark?

A. I'm a professor of statistics and associate dean of mathematical and physical sciences at the University of California - Berkeley.

Q. And what are your areas of research expertise?

A. Broadly, I work on uncertainty quantification that applies to a bunch of different applications ranging from astrophysics and cosmology on one hand to elections and nutrition and human hearing in another direction.

1 Q. And when you say that one of your areas is elections,
2 can you explain specifically your expertise in
3 elections?

4 A. Yes. I've been working in election integrity and
5 specifically on methods to determine how accurately
6 votes are counted and to audit election results to
7 assure that the reported winners are the winners
8 according to the underlying ballots, how people voted.
9 I've been working in that area since 2007 when I served
10 on then California Secretary of State Debra Bowen's
11 Post-Election Audit Standards Working Group. That
12 turned into an academic research area for me.

13 Then working shoulder-to-shoulder with local
14 election officials in approximately 20 different
15 jurisdictions in California and Colorado to develop
16 methods that were contracted to audit elections based
17 on laws and regulations to improve election integrity
18 and improve election audits. Testified to both Houses
19 of the California Legislature on auditing methods. My
20 methods ended up being incorporated into laws in
21 Colorado and California.

22 I've made presentations to professional
23 organizations of elections officials including IACREOT,
24 International Association of Clerks, Recorders,
25 Election Officials, and Treasurers, and CACEO, the

1 California Association of Clerks and Election
2 Officials. I currently serve on the Board of Advisors
3 the of U.S. Election Assistance Commission. I was part
4 of the (unintelligible) from the USEAC earlier
5 (unintelligible) in California and Colorado.

6 THE COURT: Professor, this is Judge
7 Bailey-Rihn. You are breaking up again. If
8 you might want to talk a little slower and a
9 little closer. I know our court reporter's
10 having a hard time getting down your
11 testimony.

12 THE WITNESS: I apologize.

13 MS. GREENBERGER: I ask the Court to
14 recognize Professor Stark as an expert. I
15 believe there's no objection.

16 MR. MURPHY: In what fields?

17 MS. GREENBERGER: In the fields as a
18 statistical expert and in the fields of
19 election integrity.

20 MR. MURPHY: I think election
21 integrity is too broad. I think that
22 statistics and maybe statistical analyses of
23 elections would not be objectionable.

24 MS. GREENBERGER: Let me lay further
25 foundation, if you will, your Honor.

1 THE COURT: That's fine.

2 Q. Professor Stark, can you speak more specifically
3 about the background and experience that you have
4 specifically as to issues of election integrity.

5 A. I've written a number of peer-refereed articles on
6 election integrity including an article called
7 Evidence-Based Elections, which was written jointly
8 with Professor David Wagner, a computer scientist here.
9 I've been an invited speaker or keynote speaker at a
10 variety of conferences nationally and internationally
11 relating to election integrity and verifiability of
12 voting, transparency voting.

13 I'm working with a group in Travis County, Texas,
14 where Austin is. The group is led by Dan Wallach,
15 computer science professor for Rice University,
16 developing a voting system that is designed to be
17 auditable, transparent, and who are combining
18 cryptographic end-to-end verifiability with paper based
19 audits, an audit trail. Let's see. What else.

20 Q. And I believe that you also previously testified that
21 you're on the Board of Advisors on the U.S. Election
22 Assistance Commission?

23 A. Yes, ma'am.

24 Q. And other than the Texas group that you were working
25 with, have you consulted for any other government

1 agencies on election integrity issues?

2 A. Yes. For the California Secretary of State's office
3 and the Colorado Secretary of State's office. And then
4 I've also worked with individual jurisdictions in
5 California and Colorado as well as in Denmark on
6 methods to ensure the integrity and accuracy of counts.

7 MS. GREENBERGER: I would ask the
8 Court to recognize Professor Stark as an
9 expert both in statistics and election
10 integrity.

11 THE COURT: Any response?

12 MR. MURPHY: Your Honor, I'm not
13 trying to be obstructionist. According to
14 his CV, he's only been in the past been
15 qualified as an expert in statistics. And
16 he's certainly qualified in statistics in
17 math and certainly in the field of elections,
18 but I think that election integrity,
19 particularly in things like conceivable
20 foreign influence, is just outside the scope
21 of what he's shown here.

22 MS. GREENBERGER: I don't believe he's
23 going to be testifying about foreign
24 influence, your Honor.

25 MR. MURPHY: That's fine then. Maybe

1 we can -- I can reserve my objections for
2 relevance, your Honor.

3 THE COURT: That's fine.

4 THE WITNESS: May I interject a couple
5 of more things? I --

6 THE COURT: Sir, you need to wait
7 until your counsel asks some questions. But
8 I will -- I found based on his background --
9 Professor -- I will allow him to testify as
10 an expert in the two areas that you
11 mentioned.

12 MS. GREENBERGER: Thank you, your
13 Honor.

14 Q. Professor Stark, can you speak generally about any
15 vulnerabilities that you know of about Opti-Scan
16 computerized voting equipment?

17 A. Could you clarify what you mean by "vulnerabilities"?

18 Q. Sure. I mean -- let me go back. Are you familiar
19 with Opti-Scan voting equipment?

20 A. Yes, ma'am.

21 Q. I'm sorry?

22 A. Yes, ma'am. There are several different strategies to
23 optically scan voter-marked ballots. There are
24 mark-sense style optical scan systems. There are
25 imaging-style optical scan systems. There's a great

1 deal of variety among them. But broadly, yes.

2 Q. And do you know of any errors in the tabulation of
3 optical scan voting system results --

4 A. Yes.

5 Q. -- that could occur?

6 A. Yes.

7 Q. And could you describe those.

8 A. Well, so I understand that Wisconsin is a state that
9 considers voter intent in determining whether a ballot
10 has been interpreted correctly by the voting system.
11 Optical scan systems can fail to correctly ascertain
12 voter intent for a number of different reasons ranging
13 from problems with how they are configured, problems
14 with how they are maintained, mechanical issues,
15 failing to scan all of the ballots or scanning some
16 batches of ballots more than once, mechanical problems
17 such as mis-picks and mis-feeds or jams.

18 The inability of software to perfectly ascertain
19 voter intent from various kinds of voter marks, there
20 can be variability according to the kind of ink that
21 the voter uses to mark the ballots, variability
22 depending on whether the voter marked the ballot per
23 instructions or makes a mark like circling something
24 that should be filled in or putting an X where
25 something should be filled in.

1 There can be variations in how the equipment reads
2 ballots depending on the physical length of the ballot.
3 I know of an instance where the printer had trimmed the
4 ballots to an incorrect length resulting in the
5 scanners not recording the ballots as having any votes.
6 There are instances where the scanner has overflowed
7 their buffers for counting and started to count
8 backwards.

9 There are all kinds of things that can contribute
10 to a difference between how a human adjudicator would
11 tally the votes on paper ballots and how an optical
12 scan system would tally the same votes.

13 Q. Are you aware of the margin in the Wisconsin
14 Presidential race between the President-elect and the
15 second place candidate?

16 A. Yes. I understand it to be approximately 22,500 votes.

17 Q. And given that margin, what does that mean about what
18 percentage of error would need to be made by the
19 optical scan machine for that error to effect the
20 outcome of the Wisconsin vote?

21 A. Well, errors in the interpretation of less than
22 0.38 percent of the ballots could result in causing a
23 tie or a win for Secretary Clinton appear to be a win
24 for Mr. Trump.

25 Q. And when you say less than 0.38 percent, that means

1 less than 1 percent, right?

2 A. Yes, ma'am.

3 Q. As far --

4 A. It's less than four-tenths of a percent.

5 Q. And does that mean that even if the vote tabulation
6 was more than 99 percent accurate, it still could be
7 inaccurate enough to effect the outcome of the
8 election statistically?

9 A. Yes, ma'am.

10 Q. Are you familiar with a recent study by Professor
11 Walter Mebane about the Wisconsin vote?

12 MR. MURPHY: Your Honor, I object to
13 this line. I'll elaborate if you'd like.

14 THE COURT: Sure.

15 MR. MURPHY: This came up in the
16 declaration, and Professor Mebane apparently
17 did a study. That study was reported on in
18 the Washington Post and Dr. Stark's affidavit
19 explains his interpretation of the Washington
20 Post article. This is just too far removed.
21 It's an attempt to get an expert testimony
22 through the backdoor through a non-expert and
23 it's just not competent evidence.

24 MS. GREENBERGER: Your Honor, first of
25 all, that's incorrect. Professor Stark

1 reviewed the study itself, which is also
2 attached to his affidavit as Exhibit B, not
3 just the Washington Post article. They're
4 both attached. And as an expert, he can
5 review all competent evidence. And to the
6 extent they want to cross him on the
7 competency of the evidence, they're welcome
8 to, but it's certainly well within his
9 competency as a statistician to review other
10 peers' studies and evaluate them.

11 THE COURT: I'll overrule the
12 objection. You can ask him questions about
13 it.

14 MS. GREENBERGER: Thank you, your
15 Honor.

16 Q. Professor Stark, are you familiar with a recent study
17 by Professor Walter Mebane concerning the voting data
18 from Wisconsin?

19 A. Yes, ma'am.

20 Q. And can you explain to the Court what the study
21 found?

22 A. Broadly, yes. So Professor Mebane, I know him
23 personally --

24 Q. And if you can speak up, please.

25 A. Yes. Professor Mebane, I know him personally. He's a

1 professor of political science and statistics at the
2 University of Michigan. He's an expert on election
3 fraud and detecting election fraud statistically from
4 reported election results.

5 This particular paper of his, a working paper,
6 uses ward levels from Wisconsin from the current
7 elections. I understand that the data were current as
8 of approximately a week ago.

9 He applies a battery of standard tests for
10 suspicious election results to this board level data
11 from the Wisconsin election. The tests were developed
12 -- the software that conducted the test I understand
13 was developed by him and others under -- with funding
14 from the USAID.

15 What we find is that according to several of those
16 tests, the results from optical scan systems in smaller
17 wards are suspicious in that under a standard
18 statistical model for the digit frequency of terminal
19 digits or the next to the last -- or the second digit,
20 the numbers are different than expected by an amount
21 that would be considered statistically significant.

22 Moreover, the frequency of zeros and fives, the
23 count is surprisingly -- and the terminal digit of the
24 count is surprisingly low. In the ward count, the
25 terminal digit of zeros and fives in the rounded

1 percentage error of a candidate was surprising in some
2 of those smaller wards.

3 There also appears to be multi-modality, meaning
4 there's more than one most frequent digit in the
5 distribution of those supporting some of the tests that
6 he did.

7 Q. So, if I understand your testimony correctly -- and I
8 know this is very sophisticated expert testimony, but
9 I'm going to try to make it clear for everyone --
10 what you're saying is that there were suspicious
11 results that he found in terms of the vote totals; is
12 that correct?

13 A. Yes. None of this is conclusive. None of this
14 demonstrates conclusively that the totals are erroneous
15 or that anything malicious happened. The only way to
16 determine that conclusively is to go back to the paper
17 records by hand and examine them. But these
18 statistical results would be surprising under standard
19 models for what results ought to look like including
20 things like the last digit of the results somebody
21 expects to be equally likely to be 0, 1, 2, 3, 4, 5, 6,
22 7, 8, 9.

23 Q. So what you're calling suspicious and surprising is
24 not the total number of votes that the
25 President-elect won but instead the exact number in

1 terms of the last number of vote totals; is that fair
2 to say?

3 A. According to one of the tests, yes. None of the test
4 is comparing the reported percentages or number of
5 votes to the share that a candidate was expected to get
6 according to polling or anything else. Rather, these
7 are just looking at the numbers themselves and saying
8 in situations where we count things in large numbers,
9 we would not expect any particular digit to occur more
10 frequently than any other in the 1's place in the
11 count. So if you see that in the 1's place in the
12 count you tend to get numbers that are smaller than 5
13 more frequently, or you tend to get 0 or 5 less
14 frequently than you would expect, that may be a mark
15 that the numbers are -- that something has caused the
16 numbers to differ from their true values.

17 Q. And did these suspicious, surprising results occur in
18 Opti-Scan areas, or areas that have the other type of
19 voting machine in Wisconsin, DRE areas?

20 A. The ones I was just mentioning are in Opti-Scan areas.

21 Q. You said that the only way, as I understand your
22 testimony, to determine whether these suspicious
23 results indicate that something malicious occurred is
24 to do a hand recount; was that your testimony?

25 A. Yes, ma'am.

1 Q. And why is that?

2 A. Well, first of all, the amount of error that could have
3 caused the electoral result to differ from -- the
4 pre-electoral result to differ from the reported result
5 is very small and could easily have occurred as a
6 result of either innocence, you know, sort of normal
7 errors, normal malfunction or limitations of optical
8 scan equipment, or as a result of some kind of bugs or
9 errors in the software or malicious hacking of the
10 software or systems. To simply put the same ballots
11 back through the optical system and tally them again
12 that way --

13 I mean, an analogy for that would be someone goes
14 to a doctor and gets a diagnoses and says I'd like a
15 second opinion and the doctor says Okay, I still have
16 that diagnoses as opposed to going to a second doctor
17 for an independent diagnosis. To ask the system to
18 check itself will detect some kinds of errors, but
19 there are many kinds of errors that cannot be detected
20 by simply re-scanning the same ballots and processing
21 them with the same hardware and the same software that
22 was used to create the original counts.

23 Q. And you said that the normal errors or malicious
24 hacking might not be determined from an automatic
25 recount. Is that because of the small margin between

1 the first and second place finisher that you talked
2 about earlier, the .38 percent number?

3 MR. MURPHY: Object as leading.

4 THE COURT: Sustain that.

5 Q. When you speak about the normal errors that could
6 affect the results, how is that related to the vote
7 counts here, if at all?

8 A. Some of the normal errors would simply be repeated if
9 you re-scan the same ballots, if not repeated exactly,
10 then repeated approximately. For example, if a voter
11 had mis-marked a ballot by circling the vote target
12 instead of filling in the vote target, the machine
13 would be likely to misread it the same way both times
14 that ballot was scanned. If two ballots were stuck
15 together in the scan and went through together the
16 first time, it could be likely that those same two
17 ballots would be stuck together the second time they go
18 through the machine. If the software in the scanner
19 had bugs or had been hacked, it would be expected to
20 behave the same time [sic] both times the ballots were
21 fed through the machine. There would be no way on the
22 basis of a re-scan to determine whether the original
23 results were wrong. At best, you would find out
24 whether asking the same question of the same device
25 produces the same answer.

1 Q. Thank you. Moving to a different area, did you
2 review the submission from the State of Wisconsin
3 that was received earlier this afternoon?

4 A. I reviewed part of it.

5 Q. And did you see that Wisconsin has stated that they
6 rely on the U.S. Election Assistance Commission's
7 program of certification of election equipment?

8 A. I read that in Mr. Haas' declaration, yes.

9 Q. And I believe you earlier testified that you're
10 actually on the Board of Advisors of that same U.S.
11 Election Assistance Commission; is that correct?

12 A. Yes, ma'am.

13 Q. And what is your view about Wisconsin's reliance on
14 the Election Assistance Commission's certification of
15 election equipment?

16 A. I think that all other things being equal, it's
17 probably better to use certified equipment than not at
18 this stage of the market. But that certification is
19 not a guarantee of election accuracy.

20 To use an analogy, to rely on certification as
21 insurance of the accuracy of the result would be like a
22 brain surgeon saying I used a sterile scalpel,
23 therefore, the patient is fine. All other things being
24 equal, it's certainly better to use a sterile scalpel
25 than one that isn't sterile. But if you want to know

1 whether the operation went well, you have to look at
2 the patient. Similarly, probably better to use
3 certified equipment than not. But if you want to know
4 if the election went well, you have to look at the
5 ballots.

6 Q. And you said certification is not a guarantee of
7 accuracy. Tell me why that is.

8 A. Well, the part of certification test that relates to
9 tabulation accuracy amounts to taking a brand new
10 machine, running machine-marked ballots through that
11 machine in a laboratory, and figuring out whether the
12 equipment is capable of tallying votes to a pre-
13 specified level of accuracy.

14 In a real election, you have equipment that has
15 been in a warehouse. It's been transported. It's some
16 years old. It's being set up by poll workers who have
17 varying degrees of training. It's being fed ballots
18 that had been marked by real voters rather than
19 perfectly marked ballots. The accuracy with which that
20 tabulation occurs is very different in principle from
21 the accuracy with which a brand new machine processes
22 machine-marked ballots.

23 Q. Does the certification ensure that this machine could
24 not be vulnerable to a cyber attack?

25 A. No, it does not.

1 Q. In that same submission from Michael Haas, did you
2 see that he spoke about Wisconsin's process of
3 auditing election results?

4 A. Yes. I understand from his declaration that Wisconsin
5 collects a hundred groups of ballots from different
6 parts of the state and compares a machine count of
7 those group of ballots to a hand count of those groups.

8 Q. And do you have a view on whether that audit ensures
9 that the election results are accurate?

10 A. Yes. It is my opinion that it does not ensure that the
11 election results are accurate for a number of reasons.

12 First of all, in the worst case, suppose that one
13 selected a hundred batches of ballots at random from
14 the state but that there were errors amounting to
15 errors in 0.4 percent or .038 percent of the ballots,
16 which is all that would be required to change the
17 electoral outcome in Wisconsin. There could be as
18 large as a 67 percent chance that none of those hundred
19 batches would show any discrepancy whatsoever.

20 Secondly, I understand that as of the date of
21 Mr. Haas' declaration, only six of those samples has
22 been drawn and only four of them have been examined.

23 The probability that you could get six perfect
24 counts and yet still have an error rate of .04 percent
25 or higher among all ballots is on the order of

1 98 percent. That could be as large as 98 percent.

2 Moreover, in his research to the four batches that
3 have been examined, he refers to them as not having any
4 unexplained discrepancies. It doesn't really matter
5 whether the discrepancies have an explanation or not.
6 What matters is whether the count according to the
7 Opti-Scan machines is equal to the count that a human
8 doing his or her best job of inferring voter intent
9 from the physical ballot will find.

10 Q. So if I understand your testimony correctly, even if
11 there was an error in Wisconsin's voting equipment
12 that was large enough to effect the outcome of the
13 election, the fact that four audits found no
14 unexplained discrepancy is not sufficient to
15 indicate -- strike that. Let me ask that again.

16 The fact that --

17 Even if there was an error --

18 -- I understand your testimony to say that
19 even if there was an error that was large enough to
20 effect the outcome of the election, there is a
21 67 percent chance that after the audit is completed,
22 that error would not be discovered. Is that correct?

23 A. The chance could be as large as about 67 percent that
24 every batch -- every one of the hundred batches
25 inspected would match perfectly and yet the answer is

1 incorrect, the electoral outcome is incorrect. Based
2 on the batches that have been examined so far, the
3 probability could be as high as about 98 percent.

4 Q. 98 percent of what?

5 A. There could be as large as 98 percent chance that those
6 four batches would show no errors whatsoever, not just
7 no unexplained discrepancies, and yet, the aggregate
8 error in the election as a whole was large enough to
9 change the apparent outcome.

10 Q. Thank you, Professor Stark.

11 MS. GREENBERGER: I have nothing
12 further.

13 THE COURT: Cross?

14 MR. MURPHY: Thank you.

15

16 CROSS-EXAMINATION

17 By Mr. Murphy:

18 Q. Professor Stark, do you have your affidavit in front
19 of you?

20 A. I will momentarily.

21 Q. Thank you.

22 A. Yes, sir, I do.

23 Q. I'll give you a moment if you want. The text of your
24 affidavit, pages 1 through 8 through paragraph 39,
25 doesn't identify Exhibit B to that anywhere, does it?

1 A. Doesn't identify what? I'm sorry?

2 Q. What Exhibit B is?

3 A. Oh. No, it does not.

4 Q. Thank you. So, turning to Exhibit B -- and just

5 briefly, if you turn to the cover page of Exhibit B,

6 it doesn't identify what it is, does it?

7 A. No. It just says Exhibit B.

8 Q. All right. Thank you. But this is the Mebane study

9 that you discussed in the text of your affidavit?

10 A. Yes, sir. That's working paper downloaded from his

11 website. The URL for it is in a footnote in the body

12 of my affidavit.

13 Q. All right. Thank you. This is not your working

14 paper, right?

15 A. No, sir, it's not.

16 Q. So you're relying on the analysis and procedures of

17 Dr. Mebane?

18 A. I'm taking his work at face value.

19 Q. Thank you. On page 6 -- it's the last page of it --

20 I'm going to read you -- it's short -- the second

21 full paragraph. It says *Why do Small wards with*

22 *Opscan technology (and several other kinds of wards)*

23 *have anomalies, and why do the anomalies mean that*

24 *the reported vote counts do not --*

25 Excuse me. I misread that. I'm going to

1 start over because the text is important.

2 "Why do Small wards with Opscan technology
3 (and several other kinds of wards) have anomalies,
4 and do the anomalies mean the reported vote counts do
5 not accurately reflect the intentions of the
6 electors," question mark. "Given all the information
7 we have, it is hard to say." Do you see that?

8 A. Yes, sir.

9 Q. And since you didn't do the research on this, you
10 didn't have any basis to disagree with that, right?

11 A. That's correct.

12 Q. Thank you. Earlier in your testimony you identified
13 a number of potential problems with Opscan reading of
14 ballots. This is not meant to be an exhaustive list,
15 but examples are how it's maintained, mis-trimming of
16 the ballots, scanning ballots more than once. Right?

17 A. Yes, sir.

18 Q. Those are potential problems of any Opscan system,
19 right, not just Wisconsin?

20 A. Yes, sir.

21 Q. All right. Thank you. And you don't know how the
22 machines in Wisconsin are maintained, right?

23 A. I have no specific knowledge. I would imagine that it
24 varies quite a bit from jurisdiction to jurisdiction.

25 Q. And you don't have any knowledge that ballots were

1 seconded more than once in Wisconsin, right?

2 A. No, sir. I understand that to be a fairly routine
3 error, but I don't have any specific information about
4 Wisconsin.

5 Q. And you're not aware of a printer mis-trimming the
6 length of any ballots in Wisconsin?

7 A. No, sir.

8 Q. And you're not aware of any buffer overflows that
9 would cause backward counting in Wisconsin?

10 A. No, sir.

11 Q. Of those types of systemic errors, there's no reason
12 to think that they would all error in the direction
13 of one candidate or another, is there?

14 A. For those particular errors, I can't think of a reason
15 that they would favor one candidate rather than
16 another. But some are -- they're haphazard in nature
17 and it would be difficult to predict what their effect
18 would be on the count.

19 Q. Okay. Thank you. You gave some opinions toward the
20 end of your testimony about the audits that Wisconsin
21 does as described in the Haas declaration and some
22 opinions about the statistical significance and how
23 much error there could be based on that audit. Is
24 that fair?

25 A. Yes, sir.

1 Q. You don't know the number of ballots in each batch of
2 audited ballots in Wisconsin, do you?

3 A. No, sir.

4 MR. MURPHY: Just one moment, your
5 Honor.

6 THE COURT: That's fine.

7 MR. MURPHY: I have no further
8 questions. Thank you.

9 THE COURT: Okay. Any further direct?

10 MS. GREENBERGER: No.

11 THE COURT: Any questions?

12 MR. KAUL: No questions, your Honor.

13 THE COURT: Professor, this is Judge
14 Bailey-Rihn. I'm going to ask you a few
15 questions if that's all right with counsel.

16 MS. GREENBERGER: It is, your Honor.

17 THE COURT: Thank you.

18

19 EXAMINATION

20 By the Court:

21 Q. The study that you relied on for part of your
22 opinions, that was performed by your -- from --
23 excuse me --

24 MS. GREENBERGER: Professor Mebane,
25 your Honor?

1 THE COURT: Yes.

2 Q. Professor Mebane, do you know how many -- he
3 indicates in the study that he's looking at small
4 wards. Do you know how many wards that he focused
5 on?

6 A. My understanding is that he had data from all wards but
7 he stratifies them based on their size. If I recall
8 correctly, he considered a small ward to be one that
9 had a hundred or fewer ballots cast.

10 Q. Okay. And do you know approximately how many wards
11 that constituted?

12 A. I don't off the top of my head. I'm sorry.

13 Q. Okay. And so his conclusions were related to the
14 small wards; is that correct?

15 A. Not entirely. But the anomalies that he found were
16 primarily in the small wards. There's one column in
17 his table one that applies to large wards, and I'm not
18 quite sure what the number -- the label none means
19 there, but I don't recall what that means in the
20 caption of this paper. I'm sorry.

21 Q. Okay. And the small wards, do you think that they
22 would have added up to over 22,000 votes?

23 A. I'm sorry. I don't know how many votes there were in
24 all in them and so I'm not -- I just don't have the
25 data -- the basis on which to answer.

1 Q. Okay. And the anomalies, if I understand looking at
2 the distribution and digit test in table one were
3 both in small -- anomalies were both in districts
4 that went in favor of Mr. Trump and in favor of
5 Ms. Clinton. Is that correct, or am I reading
6 something wrong?

7 A. My understanding is that according to these tests there
8 were anomalies in districts that went for both of those
9 candidates.

10 Q. Okay. Thank you.

11 THE COURT: I have no further
12 questions. Based on that, is there any
13 redirect or recross?

14 MR. MURPHY: No.

15
16 REDIRECT EXAMINATION

17 By Ms. Greenberger:

18 Q. Does the fact that the anomaly occurred in a ward
19 that favored Trump or Clinton indicate whether the
20 anomaly caused the votes to swing in favor of Trump
21 or Clinton?

22 A. No, ma'am. The anomaly is not itself proof that
23 there's anything wrong with the counts at all. It just
24 suggests -- it just suggests that it would be prudent
25 to examine the underlying paper records to find out

1 what happened. The anomalies are not with respect to
2 the share or the magnitude of the -- they're not with
3 respect to margins in these wards. Rather, they're to
4 do with the raw numbers and whether the digit
5 frequencies appear suspicious.

6 MS. GREENBERGER: Thank you.

7 THE COURT: Any further recross?

8 MR. MURPHY: None.

9 THE COURT: All right. Any --

10 MR. KAUL: No.

11 THE COURT: -- questions? Okay. We
12 will hang up on you now. Thank you very
13 much, Professor.

14 THE WITNESS: Thank you, your Honor.

15 (End of call.)

16 THE COURT: Is this a good time to
17 take a 10 minute break?

18 MS. GREENBERGER: Yes, your Honor.

19 THE COURT: Okay. What time is it?
20 It's -- why don't we come back about 6:20 or
21 so? Is that acceptable?

22 MR. BRINCKERHOFF: Thank you, your
23 Honor.

24 (A short break is taken.)

25 THE BAILIFF: All rise for the Court.

1 THE COURT: Please be seated.

2 MR. BRINCKERHOFF: At this time we
3 would like to call Professor Ronald Rivest.

4 THE COURT: Okay. Just for a matter
5 of scheduling, how many additional witnesses
6 do you have?

7 MR. BRINCKERHOFF: I believe, unless
8 something very unexpected happens, that we
9 will be closing this piece, meaning the
10 evidentiary testimonial piece, after
11 Professor Rivest.

12 THE COURT: Okay. Thank you.

13 (Phone call is made.)

14 MR. RIVEST: Hello?

15 THE COURT: Good evening. This is
16 Judge Bailey-Rihn. How are you this evening?

17 MR. RIVEST: Fine. Thanks.

18 THE COURT: Your attorney will be
19 asking you some questions followed by some
20 cross-examination, so I'll let your attorney
21 proceed.

22 THE CLERK: We have to swear --

23 THE COURT: Oh, yes. I'm sorry.
24 Please raise your right hand.

25 MR. RIVEST: Yes.

1 THE COURT: My clerk will swear you
2 in.

3
4 RONALD L. RIVEST,
5 called as a witness, being first duly sworn,
6 testified on oath as follows:

7
8 THE WITNESS: I should say also
9 (unintelligible).

10 THE COURT: Excuse me?

11 THE WITNESS: I just wanted to
12 identify myself since I hadn't said anything
13 about my identity since the phone call
14 started.

15 THE COURT: Oh, okay. Well, your
16 counsel will ask you the name for the record,
17 and also if you could speak slowly and
18 directly into your phone so that our court
19 reporter can take down your testimony
20 accurately. That would be very helpful.

21 THE WITNESS: Will do.

22 THE COURT: Okay. You may proceed.

23 MR. BRINCKERHOFF: Thank you.

24

25

DIRECT EXAMINATION

By Mr. Brinckerhoff:

Q. Professor Rivest, can you state your full name for the record and spell it, please.

A. My full name for the record is Ronald Linn Rivest, R-O-N-A-L-D, middle name L-I-N-N, last name Rivest, R-I-V-E-S-T.

Q. And, Professor Rivest, what is your current professional position?

A. I'm an institute professor at the Massachusetts Institute of Technology.

Q. And do you have any particular areas of expertise or interest as an institute professor at MIT?

A. I do research in security broadly, including cryptography and election security.

Q. And have you received any awards over the years for your work in computer science, cryptography, and/or election security?

A. I've received awards. They're listed on my website. The most notable award I've received is perhaps the ACM Turing Award.

Q. And can you tell me what the Turing Award is?

A. It's an award for contributions to computer science. In this particular case it relates to the invention of the public-key cryptosystem known as RSA.

1 Q. And in your election integrity work, have you had an
2 opportunity from a computer science perspective to
3 examine voting systems that are typically used within
4 the United States?

5 A. So I've had some contacts with the particular voting
6 systems and most of my work tends to be more
7 mathematical and theoretical.

8 Q. And, Professor, when you mentioned the RSA
9 cryptography, can you tell me what that is?

10 A. Sure. It's a public-key cryptosystem that's used in
11 most web browsers these days for securing the browser
12 connection. It involves the product of large prime
13 numbers, and encryption is performed by performing
14 modular exponentiation where the module is the product
15 of prime numbers.

16 Q. And do you do any research into the potential
17 vulnerabilities of computer systems from malicious
18 kinds of intrusion?

19 A. More of my research relates to trying to detect
20 compromises and design systems that are immune from
21 compromises. Most of the work on detection of
22 compromises has to do with auditing technology.

23 MR. BRINCKERHOFF: At this time I
24 would ask the Court formally recognize
25 Professor Rivest as an expert in computer

1 science and specifically in the area of
2 cryptography and election integrity and
3 security.

4 MR. MURPHY: No objection.

5 THE COURT: So noted.

6 Q. Professor Rivest, are you familiar with a term called
7 "software independence"?

8 A. Yes. That's a term that I coined together with my
9 coauthor Jonathan Wack.

10 Q. And can you tell me what it means?

11 A. We coined that term -- it's very similar to the notion
12 of auditability. It means that a software, a voting
13 system in particular, is software independent if an
14 undetected change in the software can't cause an
15 undetectable change in the election outcome.

16 Q. And so if a system exhibits this characteristic that
17 you coined software independence, I take it that
18 means that the system would be more secure versus
19 less secure?

20 A. It means that it's more auditable. Yes. It means that
21 you're -- if it's software independent, it means you're
22 not in a software dependent state. In a software
23 dependent state, you're basically in a situation where
24 you have to trust the software.

25 Q. And in American elections in general using scanning

1 technology, is that an example of software
2 independence or dependence?

3 A. That's an example of software independence because you
4 have the opportunity to detect if the scanner was
5 misbehaving by examining the paper ballots.

6 Q. Aside from examining the paper ballots, is there any
7 other way that you're aware of based on your
8 experience in the computer science field to detect
9 whether or not there is a problem with the software
10 that is used to drive the machinery of the election?

11 A. Well, there are other methods that might be used, but
12 they tend to be very complicated, imperfect, and
13 expensive and only partial. For example, one could try
14 to examine a code that was running on the machine,
15 however, most machines, voting machines, don't even
16 have the ability to examine the code. It's loaded onto
17 the machine. You don't know what machine is -- what
18 software is actually controlling the machine.

19 Q. You're saying that when it comes to voting machine
20 software -- and let's be specific here and talk about
21 specifically the scanning kind of technology and
22 software -- are you saying that there's no way to
23 independently verify even what software is running on
24 those machines?

25 A. That's correct. I mean, you're putting trust in the

1 vendor that when you load the software onto the machine
2 that that software is what is actually running. It
3 could be the case that the software on the machine is
4 some other software that was installed some other way
5 and the software that you think is loaded is in fact
6 ignored.

7 Q. And do you have an opinion in general about how
8 vulnerable Opti-Scan technology is as it's used
9 currently in American elections?

10 A. Only when I read through other reports of other
11 researchers. I have not directly investigated them.
12 These machines are computers. They tend to be rather
13 simple from a security viewpoint. They can be
14 compromised. So their vulnerability is noticeable.
15 Whether they're actually being compromised in the
16 field, I don't have any evidence.

17 Q. I understand. So, I take it that your testimony just
18 now is that they're vulnerable but what you don't
19 know is whether or not they've been compromised; is
20 that accurate?

21 A. That's correct. I don't know -- I don't have direct
22 information about compromises of this machine.

23 Q. And I think consistent with the motion that you
24 mentioned a few minutes ago, given the nature of the
25 software, are there any other methods besides

1 recounting the hand paper ballots that you're aware
2 of in a system like Wisconsin where you have
3 Opti-Scan machines and paper ballots that could be
4 used to detect whether or not the election systems
5 were compromised by malicious software -- or, sorry,
6 malicious intrusion?

7 A. No, I don't know of any. The idea, for example, of
8 rerunning all of the ballots through the same machines
9 certainly fails to detect whether those machines have
10 been compromised.

11 Q. And why is that?

12 A. Because if they're faulty, if they're malicious, and
13 they sort of preplanned errors or changes, the
14 rerunning of the data through those machines, one would
15 expect to get the same results out of those machines
16 again, erroneous results.

17 Q. And, Professor Rivest, you're familiar, I believe,
18 with the fact that at the moment some of the counties
19 in Wisconsin will be rerunning these ballots through
20 machines and others will not. Do you have an opinion
21 as to which one of those methods is likely to be the
22 most reliable and reflective of the actual votes cast
23 on election day?

24 A. I would strongly favor the counties or the
25 jurisdictions that are doing a hand count of the

1 ballots themselves because that reflects the will of
2 the voters without the potential corruption of any
3 errors in the programming of the machines that are
4 doing the scanning.

5 Q. Okay. And I take it -- we've mentioned malicious
6 intrusions and errors. Am I correct that both of
7 those kinds of problems can result in vote
8 tabulations and tallies being inaccurate?

9 A. That's correct. I mean, it need not be a malicious
10 intrusion that would cause an error. It may just be a
11 mis-programming that causes votes for A to be counted
12 for B and vice versa.

13 Q. And, Professor Rivest, I understand that you are a
14 supporter of voting systems that create a
15 contemporaneous voter completed record of the vote;
16 is that right?

17 A. Yes. A voter --

18 Q. And why is it that -- go ahead. Sorry.

19 A. A voter verified paper audit trail of some sort.

20 The question's why. I think that if the only
21 official record of how the voters' choices are
22 electronic bits somewhere in the guts of a machine, the
23 voter has no real ability to tell whether those bits
24 are being accurately set to record his choices.

25 Q. And do you have an opinion of how reliable you would

1 consider the vote to be in Wisconsin if all of the
2 ballots were examined by hand?

3 A. I think the hand count is typically viewed as the gold
4 standard for accuracy if it's done well. You have a
5 number of people looking at each ballot and checking
6 for voter intent and recording it multiple ways. So
7 this would be the highest, not to say that it's
8 perfect, but it's the best we know how to do.

9 MR. BRINCKERHOFF: Excuse me just one
10 minute. Sorry, Professor Rivest.

11 THE WITNESS: Sure.

12 Q. Professor Rivest, are you familiar with a term called
13 "script kiddie"?

14 A. Yes.

15 Q. Can you tell me what that is, please.

16 A. So, that's a term that relates more to the eighties and
17 nineties perhaps when the hackers of the computer
18 system were perhaps high school kids who didn't know
19 really anything about security and attacked systems
20 merely by copying a script from a website somewhere and
21 applying it against another website that you wish to
22 attack.

23 Q. And do you have any view or opinion about whether or
24 not the Wisconsin election system is vulnerable to
25 some kind of intrusion by script kiddie?

1 A. I wouldn't think they would be.

2 Q. Okay. And do you have any opinion or view about
3 whether the Wisconsin election system is vulnerable
4 to intrusion or attack by a more sophisticated
5 state-sponsored, potentially, hackers?

6 A. I think we've learned over the last decade or so that
7 almost any system can be compromised by an adversary
8 who's skillful and persistent and determined. I think
9 that -- and I've seen this with my own company, RSA
10 Security, that's had various break-ins, whether they're
11 by the Chinese. We've seen it with military
12 establishments.

13 And I think when you talk about security for the
14 Wisconsin voting system, you should keep in mind not
15 only the servers and voting systems of the election
16 system themselves but also those of the vendors and
17 distributors that are supplying the software. And one
18 should think not only of what happens on election day
19 but what happens in the months and years beforehand.
20 If a foreign power were to gain the passwords of all of
21 the election officials of the state, how secure would
22 the system be then? That could be something that could
23 have happened well before election day.

24 Q. So, Professor Rivest, do you have any confidence
25 based on your knowledge of computer science that the

1 Wisconsin election this year, the Presidential
2 election, was not compromised in some fashion by some
3 kind of foreign malicious attack?

4 MR. MURPHY: Object to foundation.

5 THE COURT: I'm going to overrule it.

6 THE WITNESS: So I should proceed to
7 answer?

8 MR. BRINCKERHOFF: Yes.

9 A. So the evidence that I would look for to be confident
10 that the system was not attacked would be an
11 examination by hand of the paper ballots. That would
12 be the level of assurance that I would look for. And
13 so this recount with a recount by hand would provide
14 that assurance. Absent that, my level of assurance is
15 beneath my standards.

16 Q. Thank you, Professor Rivest. I don't have any
17 further questions. We really appreciate you taking
18 the time today, or this evening I should say.

19 A. Sure.

20 THE COURT: Counsel,
21 cross-examination?

22 MR. MURPHY: Yes. Thank you.
23
24
25

CROSS-EXAMINATION

By Mr. Murphy:

Q. Professor, I believe you just testified that almost any system like the scanning system you've been discussing could potentially be compromised, right?

A. Almost any computer system could be compromised, yes, that's correct.

Q. So that analysis is in no way specific to voting procedures in Wisconsin, right?

A. That's not. That's correct. I mean, I think that the equipment that's used in Wisconsin is, by and large, rather generic, in fact, rather primitive in some regards compared to security systems of many computers. But, you're right. It's more of a generic system that the computer systems in general tend to be fragile and don't have the kind of security that we'd like to see them have.

Q. Is it fair to say that you have a mistrust of Opti-scanning system in elections?

A. They're a useful tool. I like optical scan systems. And I think that having a quick count by an optical scan system is nice. I think that generally they're pretty reliable. And when they're not tampered with, they're pretty accurate. I favor having a statistical audit of their results to verify that they're accurate.

1 In Wisconsin we have -- well, I can answer -- go
2 on at more length about this. But, you know, they're
3 not perfect. And I think that our statistical audit of
4 the system is just good practice and should be
5 followed.

6 Q. Are you aware of any evidence that malicious software
7 or other compromises have been installed in Wisconsin
8 voting machines?

9 A. What sort of evidence would you imagine that it might
10 have? I don't quite understand how I would be in a
11 position to answer that.

12 Q. Well, I'll start with paragraph 33 of your affidavit
13 where you say, "I should emphasize that I have no
14 particular evidence of manipulation or tampering of
15 the ballots or the results of the 2016 U.S.
16 Presidential election." Is that accurate?

17 A. That's correct.

18 Q. And that's accurate of Wisconsin as included in the
19 U.S. Presidential election, right?

20 A. Yes.

21 MR. MURPHY: No further questions,
22 your Honor.

23 THE COURT: Thank you. Any redirect?

24 MR. BRINCKERHOFF: No, your Honor.

25 THE COURT: Any questions?

1 MR. KAUL: No questions, your Honor.

2 THE COURT: All right. We'll hang up
3 on you now. Thank you very much for your
4 time.

5 THE WITNESS: Thank you very much.

6 (End of call.)

7 THE COURT: Any further witnesses?

8 MR. BRINCKERHOFF: No further
9 witnesses. Although, we would, if possible,
10 subject to the Court's permission, like an
11 opportunity to make an oral presentation at
12 the end of the evidentiary piece.

13 THE COURT: Certainly. Any witness
14 for the defendant?

15 MR. MURPHY: Our first and only
16 witness will be Mike Haas.

17 THE COURT: Okay.

18

19 MICHAEL HAAS,

20 called as a witness, being first duly sworn,
21 testified on oath as follows:

22

23 THE CLERK: The chair does not move;
24 the microphone does.

25

DIRECT EXAMINATION

By Mr. Murphy:

Q. Good afternoon, Mr. Haas. Could you state your name and spell it for our court reporter.

A. Sure. Michael Haas. M-I-C-H-A-E-L, H-A-A-S.

Q. Thank you. And what is your job?

A. I'm the administrator of the Wisconsin Elections Commission, which is the state agency that administers and enforces election laws in Wisconsin.

Q. I'm going to have you elaborate a little bit on that. What are your job functions? What do you do day to day? What do you oversee?

A. I oversee our staff of approximately 30 positions. A few of our chief responsibilities are to train and provide guidance to local clerks, county clerks and municipal clerks, who conduct elections. We publish or issue guidance in a variety of forms. We conduct training, webinars, and in-person training. We attempt to administer and implement and interpret any new legislation dealing with elections. Our staff also reviews nomination papers or election petitions that are filed at the State level. We maintain -- develop and maintain the statewide voter registration system, which is a database containing all the States' registered voters. We certify election results, among

1 other tasks.

2 Q. I'm going to ask, could you expand on that a little
3 bit. So during and after an election, what are your
4 tasks?

5 A. The agencies'?

6 Q. No. Well, the agency to the extent you oversee it,
7 but regarding your knowledge.

8 A. Well, our tasks are, as I said, to work with clerks,
9 work with candidates, work with the legislature, state
10 officials, other agencies, work with federal and state
11 agencies on securing election systems. Our agency also
12 tests voting equipment, approves voting equipment for
13 use in the state of Wisconsin.

14 Q. Okay. Let's talk a little bit about the voter
15 equipment. What types of equipment does the state of
16 Wisconsin use for voting?

17 A. Wisconsin, being one of the most or the most
18 decentralized election system -- administration system
19 in the country, we have 1854 municipalities. They are
20 responsible for purchasing the voting equipment used in
21 their municipality often purchased in coordination with
22 the county clerk. And there's a variety -- a handful
23 of different types of voting equipment used in the
24 state. But generally speaking, it's optical scan
25 tabulating equipment and electronic equipment --

1 electronic tabulating equipment or DREs.

2 Q. Okay. Of those three categories, what's a real
3 layman's explanation of the differences between
4 those? What do they do?

5 A. A DRE basically is touchscreen equipment. And so a
6 voter can go in, instead of receiving a paper ballot,
7 they use the touchscreen equipment. They cast their
8 votes on the screen. There is a voter verified paper
9 audit trail where the votes are reflected or printed,
10 basically a receipt type of cash register spool almost.
11 The voter can verify that the votes have been recorded
12 properly by the touchscreen equipment. That equipment
13 has a second spool of paper that also records the
14 identical votes, and that is the basis for any recount
15 of DRE cast votes is done using that paper spool,
16 basically a hand count of that recorded vote.

17 Then we have the optical scan equipment where a
18 voter uses a paper ballot, marks a paper ballot, and
19 inserts the ballot into the tabulating equipment.
20 Probably roughly 85 percent of ballots in Wisconsin are
21 cast -- are tallied using optical scan equipment, 10 to
22 11 percent are cast using the DREs, and the remainder
23 are hand counted ballots.

24 Q. Thank you. Has the State Legislature authorized the
25 use of those categories of machines you just

1 described?

2 A. Yes.

3 Q. Thank you. Let's talk a little bit about the
4 integrity of those machines. To start broadly, what
5 does WEC do to make sure that votes are recorded as
6 they are cast?

7 A. Well, I guess starting with the equipment, the
8 equipment is certified and tested and approved at
9 various levels starting with the federal level where it
10 is tested by independent testing labs that are
11 certified by the U.S. Elections Assistance Commission.
12 Those tests and reports are submitted to the EAC, which
13 ultimately decides whether or not to certify the
14 equipment for technical standards, security standards,
15 programming, things like that. And then at that point
16 a voting equipment manufacturer can come to the state
17 of Wisconsin, to our agency, submit an application for
18 approval. Our agency conducts a functional test of the
19 equipment to ensure that the equipment will do what the
20 statutes -- our statutes require.

21 Q. And what happens in that test?

22 A. We will create test decks of ballots and run those
23 ballots through the equipment. And with the ballots
24 being marked up in a variety of number -- variety of
25 ways, one of the goals being to just test the --

1 attempt, I guess, push the envelope with the equipment.
2 See if the equipment will tally a vote inaccurately if
3 we can try to trick the equipment, essentially. And
4 then the equipment is also often taken out on the road
5 in the field and tested in counties with municipalities
6 in more real world conditions. And a report is then
7 prepared for our Commission, which is the same process
8 we used at the Government Accountability Board. If the
9 equipment is approved, it is normally approved with a
10 number of conditions designed to ensure that the
11 equipment will continue on an ongoing basis to comply
12 with the statutes and how it tabulates votes.

13 Once the equipment is approved for use by our
14 agency, municipalities may purchase it. And then we, I
15 guess, get into the election preparation mode where the
16 equipment is tested prior to each election day.

17 Q. So, is there any equipment in use in Wisconsin today
18 that hasn't been both federally tested and approved
19 and field tested and reported on by the Elections
20 Commission?

21 A. No, with the exception of some components of the
22 equipment -- in a couple of cases there have been
23 components of equipment that were not certified by the
24 EAC and Wisconsin as a statute allowing for approval
25 even without certification. And those components --

1 the underlying system or machine had been certified by
2 the EAC but may be a component and not a modem, for
3 example, and our agency then tested and approved that
4 component.

5 Q. Okay. So there's no equipment being used now that
6 has not been field tested by the Elections
7 Commission?

8 A. Correct.

9 Q. How long have you been working in election
10 administration?

11 A. Since October of 2008.

12 Q. Is there any equipment in use today that you're not
13 comfortable produces accurate results of the will of
14 the electorate in Wisconsin?

15 A. None.

16 Q. So, let's move to what you started to explain before
17 I interrupted you. What happens with the equipment
18 before election day to ensure that the results are
19 going to be reliable?

20 A. The equipment, as I said, it needs to undergo a public
21 test within 10 days of election day, and so each
22 municipal clerk will provide public notice of the
23 public test, the public is invited to come and observe
24 the test -- the test, and in those cases a deck of test
25 ballots is created so you have essentially a

1 predetermined tally. You know how those ballots should
2 be tallied. They are run through the equipment to
3 ensure that the equipment is accurately tabulating
4 those ballots.

5 The equipment is programmed either by the county
6 clerk or more often by a voting equipment,
7 manufacturer, or vendor representative that will assist
8 the county clerk in ensuring that the equipment is
9 programmed accurately for that particular election.

10 Q. If a piece of equipment doesn't pass that test, is it
11 used on election day?

12 A. No.

13 Q. What happens to the equipment after that test is run?

14 A. So then the equipment is secured by the municipal clerk
15 until election day.

16 Q. What do you mean by "secured"?

17 A. Locked up. Secured. So that unauthorized individuals
18 do not have access to it.

19 On election day then, the tabulating equipment,
20 there's a protocol for the election inspectors or the
21 poll workers to ensure that there are no votes recorded
22 as being tallied prior to the polls being opened with
23 the equipment.

24 Q. Can you just explain that one more time. I think I
25 got it, but what's the effect of that? What is that

1 a safeguard against?

2 A. It's to safeguard -- it's to ensure that there are no
3 votes tallied prior to the ballots being inserted into
4 the tabulating equipment.

5 Q. Okay. Are the machines ever connected to the
6 Internet before an election day?

7 A. Nope, the machines are not connected --

8 MR. BRINCKERHOFF: Objection.

9 Foundation of what machines we're talking
10 about.

11 MR. MURPHY: Voting election
12 tabulation machines in the state of
13 Wisconsin.

14 A. They are not connected to the Internet on election day.

15 Q. Okay. Speaking in particular about the 2016
16 election, are you aware of any evidence of any
17 unauthorized access to any voting equipment in the
18 state of Wisconsin?

19 A. None.

20 Q. What things are done -- let me back up. How are
21 votes tallied and counted after election day in
22 Wisconsin?

23 A. As I said, they could be tallied after the polls close
24 at 8 o'clock.

25 Q. Who does?

1 A. The election inspectors tally the unofficial results on
2 election night.

3 Q. Uh-huh.

4 A. And again, it can be by hand counting the ballots or
5 reading the results from the optical scan equipment or
6 the electronic equipment.

7 Q. And how are those results consolidated and recorded
8 and transmitted to you? Or what happens to the
9 transmission?

10 A. So each polling place can have one or more reporting
11 units. A reporting unit can be a single ward or a
12 combination of wards. And so the ballots are -- the
13 results are combined. You may have a ward or a
14 reporting unit where you have multiple types of voting
15 going on where ballots are tallied using optical scan
16 equipment and the DRE, or the DRE, the touchscreen, and
17 hand counted. In most cases where the touchscreens are
18 used, as I said, that's really usually a small
19 percentage -- relatively small percentage of the
20 ballots cast. And so those results are combined for
21 the contest and then those results are conveyed or
22 transmitted to the county clerk to be combined with the
23 rest of the county to report the unofficial results on
24 election night.

25 Q. Okay. And how are official results verified?

1 A. Official results?

2 Q. Yes.

3 A. The official results do not come in until the official

4 canvas.

5 Q. Right. Tell us about that process.

6 A. Okay. So in the couple of weeks after the election,

7 the counties will hold their official canvas where

8 their canvas board will meet, they will review the

9 election materials, review the results, reconcile the

10 numbers of voters with the number of ballots, and then

11 they will produce a certified canvas. Those official

12 canvas results are transmitted electronically into the

13 State's canvas reporting system. They also -- the

14 canvas board members also sign a certification that is

15 transmitted to our office of the official results.

16 Q. When you say sign one, what is that document? I

17 mean, is it something you get in paper?

18 A. Yes.

19 Q. Okay. Thank you.

20 A. It's normally -- typically faxed to us.

21 Q. What steps are taken after election day to verify

22 that the machines were working correctly?

23 A. Well, under Wisconsin statutes we have a -- after every

24 November general election, there is a post-election

25 voting equipment audit where we randomly select a

1 number of reporting units and direct municipalities to
2 conduct an audit, essentially a hand count, of ballots.
3 But the purpose of that is not necessarily to verify
4 the results. It's to verify that the voting equipment
5 is counting the ballots properly.

6 Q. Uh-huh. How are the audit locations selected?

7 A. They're selected by random. We have come up with a
8 system of -- a computer program to randomly select
9 those reporting units. We have a spreadsheet listing
10 every reporting unit for that election and the program
11 then will randomize that list.

12 We start out taking the first hundred reporting
13 units selected and then we adjust it for two reasons.
14 One is to ensure that every type of voting equipment is
15 represented in the audit and is audited at each general
16 election. And secondly, this year we slightly tweaked
17 the procedures to limit the number of reporting units
18 for any single municipality so that no municipality was
19 required to audit more than two reporting units. So
20 that often results in a handful of reporting units,
21 about the 100 figure.

22 Q. Walk us through the mechanics of an audit. What
23 happens at the machine?

24 A. Well, the -- what happens is there will be two
25 tabulators conducting a hand count.

1 Q. And a tabulator is?

2 A. An individual.

3 Q. People.

4 A. Exactly. I'm sorry. Human tabulator. Correct. And
5 they are tallying the ballots and determining whether
6 the results that -- determining whether the voting
7 equipment counted the -- counts the ballots as they
8 should.

9 Q. Is that audit being done for the 2016 fall election
10 right now?

11 A. It was ordered. We have currently suspended it in
12 light of the pending recount. There were a handful of
13 municipalities that conducted the audit even before we
14 certified the results. But as of Monday, we advised
15 the remaining municipal clerks to suspend the audit in
16 light of the recount and we would reevaluate whether it
17 would be initiated again after the recount. Because
18 the recount in a lot of ways -- although they have
19 separate purposes, a recount is you're intensively --
20 more intensively auditing many more parts of the
21 election process than the post-election audit.

22 Q. What were the results of the portions of the audit
23 that was completed before it was suspended?

24 A. Well, as I state in my affidavit, we received, I
25 believe, six audits just in the last week. We haven't

1 had time to extensively review them. On a really quick
2 review they show that there were no anomalies. In
3 other words, the voting equipment accurately counted
4 all of the ballots.

5 Q. Now, your declaration says that the audit found no
6 unexplained discrepancies. Could you expand on that?

7 A. That's probably just terminology. I think in one of
8 the four that we briefly examined, there was a
9 discrepancy in the number of ballots that were tallied
10 for write-in candidates that the equipment would not
11 have counted. And so that was -- the clerk determined
12 that the two individuals conducting the audit had
13 missed those two ballots, and so they did not come up
14 with the exact -- they were short two ballots,
15 essentially. But the clerk was convinced that she had
16 a reasonable explanation for why there was that
17 discrepancy. Again, that was not a discrepancy in how
18 the voting equipment counted the ballots.

19 Q. Okay. Do you know of any discrepancies in ballot
20 voting in this election?

21 A. I'm sorry. Could you repeat that?

22 Q. Do you know of any discrepancies in any of the ballot
23 counting for the November 2016 general election?

24 A. No. Maybe that's a broad question. I mean, we did say
25 we saw some errors that were made on election night,

1 again, for the unofficial results.

2 Q. Uh-huh.

3 A. And then when the official results came out, there were

4 discrepancies between those two figures.

5 Q. Uh-huh.

6 A. And there's one notable case in Outagamie County that

7 received some attention and there was an explanation

8 for why that discrepancy appeared.

9 Q. In the final results, are you aware of any problem

10 with the vote tabulation or counting?

11 A. No.

12 Q. Are you aware of any malware in any of the machines?

13 A. No.

14 Q. Are you aware of any cyber attacks on any of the

15 machines?

16 A. No.

17 Q. Okay. Let's talk a little bit about the recount

18 process. I guess to start, will there be a recount?

19 A. As of about 4:30 this afternoon, yes. We received the

20 funds from the Jill Stein campaign, so we have issued

21 the recount order just earlier this evening.

22 Q. Okay. When will the recount start?

23 A. Scheduled to start 9 a.m. on Thursday morning.

24 Q. Through each of the three categories of the machines

25 that you discussed at the beginning, tell us how the

1 recount is done mechanically -- mechanically
2 logistically.

3 A. So, the canvas boards will again assemble. The county
4 clerk is essentially in charge of managing the process,
5 hiring as many tabulators, individuals as they feel
6 that they need. They have a number of preliminary
7 steps again to reconcile poll lists and other election
8 materials, absentee ballots, envelopes, things like
9 that. But in the end, the votes are tallied again
10 either by hand count in the case of paper ballots that
11 were originally hand counted, or a hand count of the
12 audit trail from the touchscreen machines, or they will
13 use the optical scan equipment, or a combination of
14 those.

15 Q. I want to stop there to clarify that. So there's
16 three methods of initial accounting. Am I correct
17 that two of those are hand recounted as a matter of
18 course?

19 A. Correct.

20 Q. Okay. For the third category, who decides whether to
21 hand count or optically scan?

22 A. It's a decision of the canvas board in each county.

23 Q. Uh-huh. And, okay. Do you know whether counties are
24 choosing one or the other or both or either of those
25 mechanisms? Did they tell you?

1 A. In a survey we conducted so far, there's approximately
2 19 counties that indicated that they would use
3 tabulating equipment for some or all of their ballots.
4 And that's not -- those were based on responses from
5 the county clerk who would be making that
6 recommendation to the canvas board that would make the
7 ultimate decision.

8 Q. Why do the local authorities get to choose?

9 A. That's what the State Statute permits.

10 Q. Thank you. Based on your expertise and experience,
11 do you know why a municipality might choose hand
12 counting as opposed to mechanical counting or vice
13 versa?

14 MR. BRINCKERHOFF: Objection, calls
15 for speculation.

16 MR. MURPHY: I asked him if he knows.

17 A. Yes, I do know.

18 THE COURT: I'll overrule. I think
19 you can answer that.

20 A. It could be a variety of reasons. And as I indicated
21 in my affidavit, county clerks have different
22 viewpoints on it. So, generally speaking, we would
23 expect that the more populous counties would lean
24 towards using tabulating equipment. Although, it's my
25 understanding that Dane County, our second most populous

1 county, intends to hand count their ballots.

2 There's cost factors involved. There's
3 organizational factors involved that would weigh in
4 favor or against either method. For instance, hand
5 counting generally is going to require more tabulators,
6 more individuals hand counting those ballots.

7 One county indicated to us that they would need 60
8 tabulators rather than 20, which is what they would
9 plan for if they were using tabulating equipment.
10 There's a cost on the other hand of programming the
11 tabulating equipment that can be avoided if the ballots
12 are hand counted.

13 There's also some sense of the time savings. The
14 time savings in using tabulating equipment may not pay
15 off or be as significant depending on the scale of the
16 number of votes because each ballot needs to be
17 examined anyway before it is put into the tabulating
18 equipment.

19 So some clerks who use tabulating equipment or
20 canvas boards that use tabulating equipment on election
21 night may decide that they're going to hand count
22 anyway, avoid the cost of programming if the number of
23 ballots is not significant enough that they feel that
24 they will get a large time savings.

25 Q. In your interactions with clerks, have they expressed

1 an accuracy difference or concern between the two
2 methods?

3 A. No.

4 Q. Do you know if some clerks have already chosen a
5 method of recount that they plan to use?

6 A. Yes. Many of the clerks have chosen what they expect
7 and will recommend to the canvas boards. As I said,
8 ultimately, it's up to each canvas board.

9 Q. And they'll start the recount when?

10 A. Thursday. And in the case of counties that intend to
11 use tabulating equipment, they're already in the
12 process of lining up the programming they need to again
13 program and test the tabulating equipment before they
14 can use it at the recount.

15 Q. And that's Thursday of this week?

16 A. Right. Correct.

17 Q. And when does the recount need to be completed?

18 A. Our Commission met yesterday and directed that the
19 recount needs to be finished by 8 p.m. on
20 December 12th. That was a deadline that the Commission
21 imposed. There are some concerns or considerations
22 under federal law about a deadline of either
23 December 13th or possibly at the latest December 19th
24 in order to ensure that Wisconsin's electoral votes are
25 honored by Congress.

1 Q. Does a recount have an observation element?

2 A. Yes.

3 Q. Who can observe?

4 A. Either members of the public, and specifically

5 representatives of each candidate that is a subject --

6 or that ran in the contest that is being recounted.

7 Each candidate has a right to have representatives at

8 the recount in order to observe the process and raise

9 any objections or challenges to either the ballots or

10 the procedures.

11 Q. And what can they do? How far can their observing

12 go?

13 A. They can look at every ballot. They can look at the

14 materials. They're not supposed to be touching the

15 materials but they can be looking at every vote. They

16 can be -- they can make their own tally if they want.

17 And they can, as I said, raise any challenges in the

18 case of a hand tally whether or not they agree with how

19 the vote is being counted.

20 Q. All right. Just two more questions. Are you aware

21 of any evidence at all that voting equipment in the

22 state of Wisconsin malfunctioned or was tampered with

23 in a way that might affect the results of the

24 November 2016 general election?

25 A. No. Malfunction's a broad word, though. Voting

1 equipment malfunction, that's not unusual on election
2 day. There might have to be a maintenance person that
3 comes to repair it. But as far as malfunctions that
4 affect ultimately the official results, the answer is
5 no.

6 Q. Are you aware of any mistakes in the canvassing and
7 vote counting process that affected the results of
8 that election?

9 A. There was a minor typo in one of the official
10 certifications that would need to be corrected if it
11 stood for the Presidential election, but that has been
12 fixed and that certification --

13 Q. Yep. And I asked an imprecise question. Are you
14 aware of any mistake in the canvassing process that
15 occurred due to the use of tabulating equipment?

16 A. No.

17 MR. MURPHY: I have no further
18 questions.

19 THE COURT: Thank you. Cross?

20 MS. GREENBERGER: Thank you.

21

22 CROSS-EXAMINATION

23 By Ms. Greenberger:

24 Q. You just testified that Wisconsin purchases its
25 voting equipment from private vendors, correct?

1 A. The municipalities do. Not the State.

2 Q. Understood. But the equipment is purchased from

3 private vendors, right?

4 A. Correct. I'm not aware of any public vendors that sell

5 voting equipment.

6 Q. And when the municipalities purchase the equipment

7 from private vendors, the equipment comes

8 pre-equipped with software to enable the equipment to

9 scan and tabulate the ballot, correct?

10 A. I'm actually not sure what comes with the delivery. I

11 wouldn't be surprised if that's the case. It needs to

12 operate.

13 Q. So you certainly couldn't rebut what our experts just

14 testified to that it came with that software

15 technology, correct?

16 A. Right.

17 Q. Okay. And it is in fact true that when the equipment

18 comes from the private vendor, it already has the

19 capability to scan ballots and tabulate results,

20 right?

21 A. It has the capability to do that assuming that it's

22 programmed accurately for the specific election.

23 Q. And you testified that when you are looking to

24 purchase -- or when a municipality in Wisconsin is

25 looking to purchase new computer voting technology,

1 they do field testing, correct?

2 A. The State does the testing. When we are doing the
3 testing, often we will -- we know which municipalities
4 or counties are interested in that equipment. So as
5 part of our field testing, we will try to arrange to go
6 to those areas, but that does not mean that every
7 municipality is involved in that testing.

8 Q. But as part of your field testing, it's fair to say
9 that you don't do a forensic computer audit of the
10 equipment, correct?

11 A. Yes.

12 Q. And as part of your field testing, you don't review
13 the source code of the equipment, correct?

14 A. Right.

15 Q. So, and it's fair to say you don't have a computer
16 specialist or computer forensic scientist on staff
17 with your agency, correct?

18 A. Correct.

19 Q. So you have no way of assuring that at the time that
20 you purchased the equipment it didn't already have
21 malware or a bug in it, correct?

22 A. Well, our agency does not inspect the equipment when
23 it's delivered at the municipality, so the answer to
24 that would be no.

25 Q. And you said that a part of your field testing, you

1 do testing of stacks of ballots, correct?

2 A. Right.

3 Q. And the hope is that because those test samples are

4 accurate, the ultimate vote tabulation on election

5 day will also be accurate, right?

6 A. That testing along with the other measures as I

7 indicated, correct.

8 Q. Are you aware of the controversy that has occurred

9 with the Volkswagen cars where their admission

10 testing was accurate for the testing stage but the

11 computer software knew to distinguish between testing

12 and actual use?

13 A. Not specifically, no.

14 Q. When you -- you said that in advance of the election

15 -- I believe you said it was 10 days in advance --

16 there's a test specific to the election, correct?

17 A. Correct.

18 Q. And you said that the public is invited to that test,

19 correct?

20 A. Right.

21 Q. But the public is not permitted to inspect the

22 software in the machine at that stage, correct?

23 A. Right.

24 Q. They're not entitled to open the machine up at all,

25 correct?

1 A. Correct.

2 Q. And they can't do a forensic audit, correct?

3 A. Correct.

4 Q. And they can't do a review of the source code,
5 correct?

6 A. Correct.

7 Q. You also testified that most often the equipment is
8 programed by a private vendor for each election
9 specifically, correct?

10 A. Right.

11 Q. And that private vendor creates the ballot software
12 in their own offices, correct?

13 A. I would assume so.

14 Q. Okay. And they create that software on computers,
15 correct?

16 A. Again, I would assume so.

17 Q. And you have no way of knowing sitting here today
18 whether those computers are connected to the
19 Internet, correct?

20 A. Not directly, correct.

21 Q. And it's fair to say that it's likely that those
22 computers are connected to the Internet, right?

23 A. I don't know.

24 Q. You've never required that your private vendors keep
25 their computers not connected to the Internet,

1 correct?

2 A. The State does not. You're correct.

3 Q. And who the private vendors are that contract with
4 the municipalities in Wisconsin is public
5 information, correct?

6 A. Yes.

7 Q. Okay. And that's information that somebody who was
8 interested in a cyber attack could determine,
9 correct?

10 A. If they go to our website, sure.

11 Q. It would be as simple as going to your website?

12 A. Correct.

13 Q. Okay. So, just so I understand this, the ballot
14 software is placed onto a form of removable media; is
15 that accurate?

16 A. Yes.

17 Q. Okay. And that removable media is at some point
18 inserted into the voting machine before the election,
19 right?

20 A. Right.

21 Q. But the software gets onto the removable media by
22 being connected to an actual computer, right?

23 A. Yes.

24 Q. And that actual computer is located in a private
25 vendor's office, correct?

1 A. Again, I'm assuming it is. I don't know specifically
2 where they program the media.

3 Q. Okay. And you already said that you have no way of
4 knowing one way or the other whether that computer in
5 the private vendor's office is connected to the
6 Internet?

7 A. Yes. Correct.

8 Q. You also testified that you -- that the State of
9 Wisconsin conducts post election audits; is that
10 correct?

11 A. Yes.

12 Q. Okay. And those post-election audits are explicitly
13 not to verify that the vote count was accurate,
14 right?

15 A. It is to confirm that the voting equipment tabulates
16 the votes as it should. It is not intended to be a
17 recount or determine the winner of an election.

18 Q. And it's not used to verify the results of the
19 election before they're certified, right?

20 A. Correct. The clerks can conduct the audit before or
21 after the certification of the results.

22 Q. And the audit, you said that there's a number of
23 counties that are chosen but -- and that there's
24 various adjustments, correct?

25 A. Number of municipalities, not counties.

1 Q. Fair enough. And you said that there's two
2 adjustments to the number chosen. But is it fair to
3 say that you do not adjust for the spread of the
4 election?

5 A. Correct.

6 Q. So even in an election that was very close like
7 Wisconsin's was this year, you don't do an audit of a
8 larger number of municipalities, correct?

9 A. Right. I believe -- that's correct. Yes.

10 Q. Okay. And I believe you were here when Professor
11 Stark testified that in an election as close as this
12 one, there's a 67 percent chance that the audit even
13 if it was conducted completely would not determine --
14 would not be sufficient to determine an error if it
15 was as large as the vote spread between the first and
16 second place finisher.

17 MR. MURPHY: Object, mischaracterizes
18 his previous testimony.

19 THE COURT: Why don't you restate your
20 question.

21 MS. GREENBERGER: Sure.

22 Q. Did you hear Professor Stark's testimony that there
23 was a 67 percent chance that the audit that Wisconsin
24 would conduct would not be sufficient?

25 A. I've heard the 67 percent figure. I'm not sure

1 exactly what he was applying it to as a measure.

2 Q. And is it fair to say that the Commission has not
3 retained its own statistician to determine how large
4 of an audit would be necessary to ensure accuracy of
5 the audit?

6 A. Yes.

7 Q. And you yourself and no one in the Commission has
8 that statistical knowledge base, correct?

9 A. Correct.

10 Q. Okay. And Professor Rivest testified that a hand
11 recount is the gold standard. Did you hear that
12 testimony?

13 A. I may have been out of the room. I was out of the room
14 during part of his testimony.

15 Q. Fair enough. You don't disagree that a hand recount
16 would be the gold standard to determine the integrity
17 of an election, do you?

18 A. I guess it depends what the definition of a gold
19 standard is. A hand count, ideally, if you have all
20 the time and all the resources. I think many election
21 inspectors would love to use a hand count. But that is
22 not to say that that diminishes the quality of using
23 tabulating equipment.

24 Q. And you love to use a hand count so much that in
25 Wisconsin's own audit you audit by doing a hand

1 count, right?

2 A. Well, the purpose of the audit is to determine whether
3 the voting equipment is working properly and so we use
4 a hand count to do that.

5 Q. When you were asked about anomalies in the election
6 that occurred this year, is it fair to say that you
7 testified that as I understand it over 5,000 votes
8 were discovered to be mistakenly attributed to
9 President-elect Trump that in fact were never cast?

10 A. I don't think I testified about 5,000 votes.

11 Q. Okay. Is it fair to say that there was a mistake in
12 the vote tabulation in Wisconsin such that
13 President-elect Trump was given over 5,000 votes more
14 than he was ultimately entitled to?

15 A. You mean the unofficial results compared to the
16 official results?

17 Q. Correct.

18 A. Right. So on election night the unofficial results
19 showed that there was reportedly in the media about a
20 27,000 vote difference. Those are not results that we
21 audited or reviewed. It was reported in the media
22 based on what the counties had reported. The official
23 results show a difference of 22,177 votes. I have no
24 idea if the media made a math error or if there were
25 errors made at the local level in reporting results.

1 Q. So you haven't looked into that since that
2 information came to light on Friday?

3 A. No. Our elections are based on the official results,
4 not unofficial results and not exit polls.

5 Q. Turning to the recount that will start on Thursday,
6 as I understand your testimony, no county has made
7 the ultimate decision about whether it's going to do
8 a hand recount or an automatic recount, correct?

9 A. The formal decision is made by the canvas board. I
10 think in most if not all cases, the canvas board
11 follows the lead of the clerk who has probably
12 conducted audits in the past and has a preferred
13 method. But the formal decision will be made by each
14 county at its initial canvas board meeting.

15 Q. And they have full discretion to ignore the clerk,
16 correct?

17 A. Yes, who is on the canvas board.

18 Q. The election supervisor Ross Hein made a statement on
19 November 25th to the county clerk that in discussions
20 with Wisconsin election officials over the years, a
21 hand count may not be as time consuming as one may
22 think. You agree with that, right?

23 A. It's a pretty general statement I can agree with
24 depending on who is thinking it, yes.

25 Q. Okay. And in fact he pointed out that there are

1 advantages to a hand count because -- and I'm quoting
2 here -- it avoids pretesting of the equipment and
3 reprogramming of memory devices. That's accurate
4 too, right?

5 A. That was one of the trade-offs I referred to, correct.

6 Q. And you spoke about on the other side one of the
7 trade-offs is cost, right?

8 A. Right.

9 Q. But under Wisconsin recount procedures, the candidate
10 that petitions for the recount is required to absorb
11 all the cost, correct?

12 A. If the margin is more than one quarter of one percent.

13 Q. And so in that situation there would be no cost to
14 the public for the hand recount, no additional cost
15 to the public from a hand recount as compared to from
16 a manual recount, correct?

17 A. I would say there's no monetary cost. There's
18 certainly a cost, a significant cost in organization,
19 scheduling, recruiting, poll workers. We talked about
20 the difference, significant difference in the number of
21 individuals that you need to have. And when we have 12
22 days to conduct a recount, I think many clerks have
23 expressed to us already that they are having
24 difficulty --

25 MS. GREENBERGER: I'm going to --

1 A. -- recruiting enough people.

2 MS. GREENBERGER: -- object to his
3 hearsay.

4 Q. Stop right there.

5 MS. GREENBERGER: I move to strike.

6 THE COURT: I will sustain that.

7 Q. A number of counties have determined that they --
8 strike that.

9 A number of county clerks have recommended
10 that their counties do a hand recount, correct?

11 A. Yes.

12 Q. And that includes one of the most populous counties
13 in the state, correct?

14 A. Yes.

15 MS. GREENBERGER: I have nothing
16 further.

17 THE COURT: Thank you. Any further
18 redirect?

19 MR. KAUL: And, your Honor, I will
20 have questions. I don't know if your Honor
21 wants me to go now or later.

22 THE COURT: Oh, sure. Why don't you
23 go now.

24 MR. KAUL: Thank you. Sorry.

25 THE COURT: Thank you. Sorry about

1 that. You've been relatively quiet.

2 MR. KAUL: I understand. I'd take any
3 opportunity I can to talk to Mr. Haas.

4

5 CROSS-EXAMINATION

6 By Mr. Kaul:

7 Q. Just briefly following up on the Ross Hein statement,
8 that's a statement that you approved, correct?

9 A. I did not pre-approve it. He did not ask me if he
10 could say that, but I don't disagree with the
11 statement.

12 Q. And you were hoping the counties would do a hand
13 recount, correct?

14 A. No.

15 Q. That communication specifically mentioned that the
16 Stein campaign had asked for a hand recount, right?

17 A. I believe so.

18 Q. And as discussed, it mentioned that a hand recount
19 may not be as time consuming as people might think?

20 A. Yes.

21 Q. And it indicated that was based on discussions with
22 Wisconsin election officials over the years?

23 A. Correct.

24 Q. And that's accurate?

25 A. It's a subjective statement. As far as it goes, I

1 would say it's accurate.

2 Q. You mentioned before some -- a deadline, and I think

3 you talked about -- it's what's known as the safe

4 harbor date, right?

5 A. Right.

6 Q. And you mentioned you weren't exactly sure what that

7 date was?

8 A. No, I didn't say that.

9 Q. Well, I think you said it could be one date or

10 another date?

11 A. The safe harbor date is December 13th. The uncertainty

12 is what would really be the practical effect of the

13 recount not being completed by December 13th.

14 Q. Okay. And has Dane County -- first of all, Dane

15 County is the one that's doing the hand recount of

16 its optical scan ballots, the big county you were

17 referring to, right?

18 A. That's my understanding based on what they've told us.

19 Q. And Dane County is the second largest county in the

20 state?

21 A. By population, yes.

22 Q. And by vote total, right?

23 A. Yes.

24 Q. And has Dane County expressed to you that it has any

25 concerns about completing its recount in time?

1 A. I have not talked to Dane County representatives about
2 the timing.

3 Q. They would let you know if they were worried about
4 completing it on time, right?

5 A. The Dane County clerk doesn't always automatically let
6 us know his feelings about the timing of different
7 procedures.

8 Q. Did you read the filings in this case?

9 A. I would say I skimmed the filings given the last week
10 that we've had.

11 Q. Are you aware that in 2010 Minnesota conducted a
12 recount of the Governor's race?

13 A. Yes.

14 Q. And you're aware that was completed in five days?

15 A. I think that's what I read, yes.

16 Q. You don't have any reason to dispute that?

17 A. No.

18 Q. And that was a statewide hand recount, right?

19 A. I believe so.

20 Q. And you would agree that Wisconsin can do things as
21 well as Minnesota, right?

22 A. Absolutely. Except we can't seem to beat them in the
23 voter turnout percentage.

24 Q. I was going to make joke about losing Super Bowls but
25 --

1 Did you review the discussion in Secretary
2 Clinton's brief about problems that have occurred
3 with optical scan machines?

4 A. No.

5 Q. Are you aware of problems that optical scan machines
6 had in Iowa?

7 A. No.

8 Q. How about in Florida in 2012?

9 A. Not specifically.

10 Q. You were at the predecessor agency, the Elections
11 Commission, the GAB, in 2011 when the State Supreme
12 recount took place, right?

13 A. Right.

14 Q. And in that election, the GAB actually sought an
15 order from the Dane County Circuit Court that would
16 permit to hand count some optical scan ballots,
17 right?

18 A. Correct.

19 Q. And why was that?

20 A. Because of a shortage of the memory devices that would
21 need to be available for that equipment for the
22 recount.

23 Q. And there was a concern that the data on the system
24 would be erased if a hand recount was not done,
25 correct?

1 A. If the same memory devices were used as at the
2 election, yes.

3 Q. And that issue was discovered during the course of
4 the recount, right?

5 A. Might have been as we were preparing for the recount.
6 I don't remember exactly when, but at some point that
7 issue came to light.

8 Q. But that's not an issue that the GAB was aware of
9 prior to the recount, correct? Or prior to the
10 process of preparing for the recount at least.

11 A. Right. I mean, I think we know in general that if
12 you in a short period of time need to come up with a
13 large number of memory devices that that could be a
14 challenge. But once the recount was requested, that
15 became more of a priority issue.

16 Q. And you mentioned before that -- I believe it's the
17 candidates, and even every member of the public has
18 the right to inspect ballots during the recount
19 process before they're run through the machines?

20 A. Right.

21 Q. So an organization potentially could try to replicate
22 a hand recount essentially by looking at every ballot
23 and tallying them, right?

24 A. Right.

25 Q. And that would -- but if that were to happen, that

1 would slow the process considerably, correct?

2 A. I mean, they have the opportunity to look at every

3 ballot. I guess it depends on how quick they are in

4 marking down the hand tallies.

5 Q. But if an organization were to go ballot by ballot,

6 that would actually be much slower than just a

7 regular hand recount, right?

8 A. I'm not following you. In a hand recount, they also

9 have the right to look at every ballot.

10 Q. Yes. But if an organization were only interested in

11 doing so if there was otherwise going to be a machine

12 recount, it would slow the process, right?

13 A. If that was their wishes. They would have the same

14 rights either way.

15 Q. Right. You mentioned before that the State does an

16 audit, correct?

17 A. Right.

18 Q. And when it does the audit, is does so to -- you said

19 to determine if the tallies on the voting machines

20 were accurate?

21 A. Right.

22 Q. And you said that's why they do a hand count, right?

23 A. Right.

24 Q. But the purposes of a recount is also to determine if

25 the tallies were accurate, right?

1 A. That's one of the purposes. Maybe one of the
2 distinctions is that the -- the audit is not auditing
3 ballots that are hand counted and so it is not tallying
4 up the total votes in a particular reporting unit.

5 Q. How does that work?

6 A. They are -- they're using the -- they are testing the
7 optical scan equipment to see if it worked accurately.

8 Q. But how do they do that?

9 A. They have the two individuals that are conducting a
10 hand count of the ballots that were tabulated by the
11 voting equipment.

12 Q. Right. So it's the same thing that we'd be talking
13 about if there was a hand recount of the optical scan
14 ballots, right?

15 A. Correct.

16 Q. Okay. And you said -- and again, those aren't
17 audited by putting them back through the optical scan
18 machine?

19 A. Right. Right.

20 Q. Because that would defeat the purposes of the audit?

21 A. Right.

22 MR. KAUL: No further questions.

23 THE COURT: Thank you. Any further
24 direct?

25 MR. MURPHY: Very brief.

REDIRECT EXAMINATION

By Mr. Murphy:

Q. Are the vote tabulation machines that were in effect for the most recent fall election, were they all brand new?

A. No.

Q. Were any purchased before the candidates for that election were known?

A. Absolutely.

Q. Do you know of any hacks or malware attacks or malware affecting any of the vendors that the state of Wisconsin -- excuse me, not the state of Wisconsin, that the producers of the Wisconsin election counting equipment?

Do you know if any of these manufacturers, sellers, programmers of the equipment have any indication of any attack, malware, hacking, anything like that?

A. We have not been informed of anything like that.

Q. Is optical -- are the optical scan counters reprogrammed for each election?

A. Yes. And the manufacturers are required to certify to municipal clerks that the software that is being used is what was certified and approved both at the Federal and State level.

1 Q. Uh-huh. So, programming from previous elections
2 could not alter the results of later elections with
3 different ballots; is that right?

4 A. Correct.

5 MR. MURPHY: Nothing further.

6 THE COURT: Thank you. Any further
7 cross?

8

9 RECROSS-EXAMINATION

10 By Ms. Greenberger:

11 Q. You testified that some of the voting machines were
12 procured before the candidates were known, correct.

13 A. Yes.

14 Q. But you also earlier testified that a removable media
15 device is inserted into those voting machines, right?

16 A. Yes.

17 Q. And that removable media device is attached to an
18 external computer at a private vendor to get the
19 information to then be imputed into the voting
20 machine, right?

21 A. It's the vendor's programming, yes.

22 Q. Right. And that removable media device that's
23 programmed by the vendors is after the candidates are
24 known, right?

25 A. Yes.

1 Q. By definition it's after because it's putting on
2 there which candidates are going to be on the ballot,
3 right?

4 A. After our agency certifies the candidates who are on
5 the ballot, that's when the equipment is programmed --
6 or the media devices are programmed.

7 Q. And that's when they're programmed by a third party
8 vendor for which you have no idea what security
9 computer protocols they have, correct?

10 A. I do not know specifically what protocols they have in
11 effect.

12 MS. GREENBERGER: I have nothing
13 further.

14 THE COURT: Any further questions?

15 MR. KAUL: No questions, your Honor.

16 THE COURT: All right. If you don't
17 mind, I have a few questions. Sorry. Is
18 that alright, Counselors?

19 MR. KAUL: Yes.

20

21 EXAMINATION

22 By the Court:

23 Q. You talked about the issue regarding the memory
24 devices and the prior recount or special election. I
25 can't remember which one it was. Are those memory

1 devices -- how is that problem fixed for this
2 election or will be fixed for this recount?

3 A. Well, the touchscreen equipment will be hand counted.
4 Those ballots will be hand counted. I don't recall
5 specifically what the equipment was in 2011 that had
6 the shortage of the memory devices.

7 Q. But is that an issue in this election?

8 A. No.

9 Q. Okay. You also told me or testified that there's a
10 test on a deck for the machines. How big of a deck
11 are we talking about?

12 A. I'm guessing a hundred. I don't know specifically.

13 Q. Okay. So there's like a hundred --

14 A. -- more than that.

15 Q. -- sample ballots?

16 A. I'm guessing.

17 Q. Okay. How often -- you also testified that you do
18 these tests to make sure the equipment hasn't failed.
19 How often has the equipment failed the test?

20 A. Well, if there's a problem at the public test before an
21 election, then the clerk is required to contact the
22 vendor and make sure that the equipment is reprogrammed
23 or whatever malfunction is fixed, and then it needs to
24 be tested again. If it does not fail, then the
25 equipment is taken out of -- I mean, if it does not

1 pass, it's taken out of service for that election.

2 Q. Do you have any experience as to how often that
3 occurs?

4 A. I don't -- we hear that -- we hear sort of anecdotally
5 that it occurs occasionally. I don't know
6 statistically how often.

7 Q. Okay. You also said that the machines are not
8 connected to the Internet at the time of the
9 election. Are they ever connected to the Internet?

10 A. The only time that -- some of the newer equipment --
11 the results could be transferred in a number of
12 different ways: by phone, in person, over a modem, over
13 the telephone. Some of the newer equipment does have
14 modems that operate using wireless Internet. And so
15 after the polls close, then when those unofficial
16 results are transmitted, in some cases they could be
17 transmitted. That instantaneous transaction would be
18 conducted over the Internet.

19 Q. Okay. And how -- what percentage, if you know, of
20 the machines are -- that information's transmitted
21 that way?

22 A. I don't know. It's only in the new equipment, so
23 probably not a large percentage of the overall numbers,
24 amount of equipment in the state.

25 Q. Okay. You indicated that as the ballots -- at least

1 from what I understood, that the ballots were
2 inspected before they're fed into the machines for
3 the recount; is that correct?

4 A. Yes.

5 Q. Explain to me what they're inspected for.

6 A. Well, the two tabulators, they're looking at each
7 ballot. They will decide whether they agree or
8 disagree on how the ballots should be counted if they
9 are doing a hand tally. If they're looking at it for
10 the optical scan equipment, they're just essentially
11 inspecting it to see if they detect any issue with the
12 ballot or how it might be tabulated by the equipment.

13 Q. If they detect an issue with the ballot, what do they
14 do with it?

15 A. It may be set aside for the canvas board to determine
16 whether or not -- or how it should be counted. It also
17 depends on if there's an objection raised by any of the
18 parties about how to treat that ballot.

19 Q. And what are some of the issues they're looking for
20 on the ballot?

21 A. Well, it could be, for instance, whether or not the
22 ballot was initialed by the clerk. The ballots aren't
23 supposed to be -- or by the clerk or the inspector. So
24 there could be technical requirements that are required
25 for the ballot to be counted. There could be

1 objections raised as to whether or not that ballot
2 should be tabulated.

3 Q. Do they also look at the ballot and see if it's been
4 filled out dark enough or anything of that nature?

5 A. They could be -- right. They could be inspecting for
6 those reasons as well.

7 Q. Okay. And finally, does the State or the Commission
8 undertake any audits of its vendors to inspect their
9 security, their computer security?

10 A. We do not do visits of their locations. As I've said,
11 there are a number of conditions that apply to each
12 approval, but we don't audit their security procedures.

13 Q. Okay. Thank you.

14 THE COURT: With those questions, is
15 there any followup questions?

16 MS. GREENBERGER: No, your Honor.

17 MR. MURPHY: Very brief clarification.

18

19 FURTHER DIRECT EXAMINATION

20 By Mr. Murphy:

21 Q. You mentioned the Internet transmission of some
22 results. Are those the final results?

23 A. Those are the unofficial election results.

24 Q. It's not the official final results?

25 A. Correct.

1 Q. Thank you.

2 MR. MURPHY: Nothing further.

3 THE COURT: Any further questions?

4 MR. KAUL: No questions, your Honor.

5 THE COURT: Okay. You may step down.

6 Thank you.

7 We need to take a break for my court

8 reporter. She's in charge. Or my clerk.

9 And then we'll come back and hear argument.

10 All right?

11 MS. GREENBERGER: Thank you, your

12 Honor.

13 THE COURT: Let's take 10 minutes.

14 Come back at five to. So, thank you.

15 (A short break is taken.)

16 THE COURT: All right. Any further

17 evidence from the defendants?

18 MR. MURPHY: No.

19 THE COURT: Okay. All right. So

20 we're now at the point where I will entertain

21 arguments. So, plaintiffs?

22 And I think what I'll do is I'll do

23 plaintiffs, I'll do the intervenor just

24 because it seems like that would be the

25 logical, and then the defendants.

1 MR. BRINCKERHOFF: Good evening, your
2 Honor. We've tried to keep this as quick as
3 we can. I will try to be relatively brief.
4 But we really pretty much -- I'm sorry.

5 The Stein campaign, our client, the
6 candidate Jill Stein, the seriousness with
7 which, of course, all of this is being
8 taken -- and we're not surprised that it's
9 being taken seriously because ensuring that
10 the votes that are counted in Wisconsin are
11 accurate and in no way compromised by any
12 claims of intentional misconduct or otherwise
13 is obviously profoundly important to the
14 people of this state and frankly to all
15 citizens of this country and our democracy.
16 So we thank you for entertaining this and
17 recognizing how important I think that it is.

18 So, there are a couple things that we
19 know that I think based on the evidence
20 that's been presented and otherwise are
21 really basically beyond dispute.

22 We know that there will be a recount.
23 We know that it's going to start Thursday
24 morning. We know that it has at least
25 financially been paid for and will be paid

1 for by people other than the people of the
2 state of Wisconsin, that it will not cost the
3 taxpayers any money in that sense.

4 We know that the only question is how
5 that recount will be conducted. And the
6 central question is obviously whether it will
7 be conducted uniformly by hand or whether
8 some jurisdictions will be allowed to re-feed
9 the same ballot into the same machine and
10 functionally get what one expert testified to
11 as the same -- seeking a second opinion but
12 from the same machine, and therefore, the
13 same doctor. That's the question.

14 And the reason that this case comes
15 here today under this statute in a way that I
16 believe is unprecedented legally in this
17 state is because these circumstances are
18 unprecedented. That circumstances are
19 unprecedented because this is the first time
20 in any American election where there are
21 confirmed, by the Federal Government,
22 sustained attacks, cyber attacks, from
23 foreign IP addresses, that have been
24 successful all, aimed at our election
25 systems, all aimed at potentially influencing

1 the outcome of the election for President of
2 the United States. That is unprecedented,
3 and that is a primary reason, the motivating
4 reason, that brings us here today because of
5 that concern.

6 We also know that leading up to the
7 election what has been testified to is that
8 the DNC was successfully hacked, one of the
9 -- the campaign manager for the Clinton
10 campaign was successfully hacked. Those were
11 released in order to have an impact on the
12 election. The Illinois elections officials
13 were successfully hacked and 200,000 voter
14 records were taken or removed or stolen. The
15 Arizona election officials had a hack where
16 there was an intrusion and records were
17 removed. We also know from federal
18 authorities and public reports that the Court
19 can certainly take judicial notice of in
20 addition to the testimony we've heard today
21 that there were over 20 other attempts on
22 other state election officials, offices,
23 computers, and the like. We know all of
24 that. That's a fact.

25 We know that someone was attempting to

1 influence this election, to influence it
2 through cyber means. We know that they
3 succeeded in some places. And we also know
4 that thankfully in the state of Wisconsin,
5 unlike some other jurisdictions, we have an
6 absolute, reliable, verifiable way of
7 determining whether that happened. It's
8 right there before us. And we're going to be
9 recounting. So we know all of that.

10 We know that about the attacks, but we
11 also know from the evidence that was
12 presented today -- and it's a bit -- or I
13 found it a bit confusing. Perhaps no one
14 else did. But because of it, I want to just
15 explain it a little bit more. And that is
16 the study that Professor Stark testified to
17 concerning the work that was done, specific
18 to Wisconsin and specific to this election,
19 but the work that was done by Professor
20 Mebane.

21 That work indicates that there is
22 evidence of anomalies that are consistent
23 with someone attempting to manipulate the
24 results of election -- of the results of an
25 election. That is the basic finding that

1 that is -- that that evidence exists, that
2 it's an anomaly that's consistent with
3 potential manipulation, and it's consistent
4 with manipulation because -- and it almost
5 seems deceptively simple. I had not heard of
6 this kind of statistic testing before.

7 But basically what he looked at is we
8 have thousands of random numbers that had
9 been generated, the vote tallies, in all of
10 the wards, in all of the state of Wisconsin.
11 There's what he called the terminal digit.
12 That's just the last number in the string of
13 numbers. And any kind of randomness, a
14 statistician will tell you that that number
15 should appear equally over time if you have a
16 large enough sample, which we certainly do.
17 And because of that, the means should always
18 be somewhere within a deviation of the mean,
19 which is 4.5. And he basically analyzed
20 those final digits and concluded that in the
21 smaller -- sorry, the smaller wards, that
22 there were anomalies that are consistent with
23 some kind of potential interference.

24 Can we say that absolutely there was
25 interference? No. If we could, we'd have a

1 different kind of case than one just
2 attempting to verify and make sure that there
3 wasn't.

4 But there are anomalies that are
5 consistent with some kind of intrusion, and
6 they're both on the Trump side and the
7 Clinton side, and that's basically because
8 they're consistent with the concept of
9 manipulating the numbers in some fashion
10 through three different kinds of tests. And
11 if that were actually happening, if somebody
12 was manipulating that piece, there's no
13 reason to believe that they weren't
14 manipulating other potential parts of this
15 election. So that's what we know coming in.
16 That is what is exceptional.

17 We also know, and no one can honestly
18 seriously dispute, that all of the election
19 systems, certainly including Wisconsin's,
20 although it's not the worst, are absolutely
21 vulnerable and susceptible to hacking and
22 intrusion. There's no question about that.
23 There are officials who are working very hard
24 in good faith following statutes that are
25 appropriate for preventing the kind of script

1 kiddie sort of hacks that Professor Rivest
2 testified to. But they are woefully,
3 woefully inadequate to prevent any
4 concentrated attempt by a sophisticated group
5 of people. And we know already that those
6 people exist and were trying to influence
7 this election. Okay?

8 So, we know all of that. And we also
9 know -- sorry -- that -- so we know all of
10 the vulnerabilities. And Mr. Haas has
11 testified about the kinds of tests that they
12 do and all the rest. And there's no doubt
13 that I think those tests can find some
14 errors, correct some errors. We all want
15 accountability and verification to some
16 point. But at the end of the day, all of the
17 experts testified the systems are vulnerable,
18 and they were unanimous. These are world
19 renowned experts.

20 Professor Rivest is the person who
21 invented the technology that secures all of
22 the our communications on the Internet to the
23 maximum degree possible, the secure
24 communications that we pay for things on over
25 the Internet. He created that. And he is

1 telling the Court -- he came here. He
2 thought it was important enough to testify
3 today to make it clear to the Court, along
4 with Professor Halderman, that these systems
5 are absolutely vulnerable to anybody who's
6 sufficiently sophisticated, can absolutely
7 infect them and change the outcome of the
8 election.

9 The other thing that Dr. Halderman
10 testified to that is of course critically
11 important is that any sophisticated attempt
12 to manipulate a vote would have by logic and
13 commonsense focused on states -- because
14 people understand wherever they come from how
15 the American election system works -- where
16 there were likely to be, based on polling and
17 other predictive factors, a close margin.
18 Because you don't want to try to manipulate
19 an election that will create a result that is
20 so widely divergent from what people expect
21 that it would arouse suspicion and cause
22 things like a recount by hand that would
23 identify and verify that something had gone
24 wrong. So, we know that Wisconsin was
25 certainly in the very small subset of states

1 that would be a logical and likely target on
2 top of everything else.

3 So, at the end of the day, we're going
4 to have a recount. We've heard testimony,
5 very clear testimony, that that recount is
6 going to require that each ballot be examined
7 and that everybody will have the right,
8 including the candidates, to examine the
9 ballot and even tabulate it on their own.
10 What we want to have is confidence, absolute
11 confidence in the result of this election in
12 the state of Wisconsin. And we don't know
13 whether we'll discover anything, but it won't
14 take much to change the outcome of this
15 election.

16 You had Dr. -- I'm sorry, Professor
17 Stark testifying very clearly and plainly
18 just to be clear about what the issue is.
19 All we need is 11,000 votes to change from
20 one column to the next column for the outcome
21 of the election in the state of Wisconsin for
22 the President to change. That is less than 4
23 tenths of one percentage point. It is
24 nothing. It could be actually changed by
25 errors that are not attributable to some kind

1 of attack, but at the same time that we're
2 counting -- and there's a potential of
3 serious -- a substantial potential that the
4 outcome of the election could be changed.

5 If we hand count every vote, then we
6 will walk away from the process and every
7 citizen of the country that we live in will
8 know that this count was the most verified,
9 accurate, reliable count of anywhere in the
10 United States because it will be the only one
11 that we're aware of that will be counted
12 completely by hand. And every expert has
13 made it crystal clear and plain that that is
14 the only reliable methodology. That's the
15 reason that they insist upon in all systems
16 that make any sense a verifiable, auditable
17 paper trail. And we have it in Wisconsin.
18 And we need to use it and not just shove
19 those ballots back into the same machines
20 that may have created a problem in the first
21 place.

22 And that is the end of my argument. I
23 just urge the Court to appreciate the power,
24 obviously, that the Court has, which I know
25 you know, but to make equitable

1 determinations in this case, to make judgment
2 calls about what is best for the people of
3 the state of Wisconsin, to balance the
4 equities on some level of what it is that
5 we're asking for, the benefits to be gained
6 in trusting in our governmental institutions
7 and showing that this vote count is right, or
8 the benefit to be gained in finding out that
9 there's something terribly wrong which we
10 must know about. Both of those two things
11 are critically important. Both of those
12 things are going to further and strengthen
13 our democracy, and we urge you to take the
14 course to allow that to happen. Thank you.

15 THE COURT: Thank you. Counsel?

16 MR. KAUL: Thank you, your Honor. And
17 I'm just going to speak briefly because I
18 think we covered most of the points we wanted
19 to in our paper filing.

20 I would just say that since a recount
21 is being conducted, our position is that it
22 should be conducted as accurately and as
23 transparently as possible. I think it was
24 virtually undisputed if not entirely
25 undisputed in the testimony that the most

1 accurate way to conduct a recount is through
2 a hand count. The experts testified to that.
3 It was a gold standard for accuracy. It's
4 the best way to ascertain vote intent, and
5 it's the way that the State itself does its
6 audit when it's trying to figure out if its
7 count was correct.

8 We think there's no question that a
9 hand count can be completed statewide in a
10 timely fashion. Madison's doing it.
11 Minnesota did a statewide count in five days.
12 There's going to be a lot of work that goes
13 into it, but there's going to be a lot of
14 work that goes into this either way.

15 And then last I would just say, since
16 we didn't have a chance to address the
17 State's brief, that I think that the position
18 the State has laid out in terms of how it's
19 interpreting the governing statute can't be
20 the right one because under the position they
21 have put forward there would never be a hand
22 recount in the state. There's no way that
23 the test that they have set forth could
24 possibly be met. It's also a test not
25 consistent with the basic principles that

1 underlay Wisconsin's open government laws.
2 It's brought access to government affairs
3 generally and specifically with respect to
4 recounts. And it's also not consistent with
5 the State's stated policy of doing everything
6 possible to ascertain voter intent.

7 And so we think that all of the
8 factors here need to be taken into account
9 including the nature of the recount, the most
10 accurate method, and transparency.

11 So for those reasons we think that a
12 hand recount is appropriate.

13 THE COURT: Thank you. State?

14 MR. MURPHY: Your Honor, I think one
15 thing that's important here is what this case
16 is not about. And this is not a case about
17 whether the general system of counting
18 ballots automatically is a valid one -- is a
19 valid way to run an election.

20 I can't give you a cite, but I know
21 just from general exposure that that was
22 litigated hard decades ago when the first
23 automatic counting and scanning machines came
24 into effect. That is not what is at issue
25 here. And the statute that controls here

1 presumes the validity of the general system
2 of automatic counting votes.

3 The decision here is -- at issue here
4 is the statutory directive to give local
5 canvassers the discretion to decide the best
6 way to recount votes. A court can override
7 that statutorily mandated discretion only by
8 clear and convincing evidence of two things:
9 An irregularity or mistake in the automatic
10 counting that will produce -- that produced
11 an incorrect result, and independently, that
12 a recount by hand will result in a
13 substantial probability that the result will
14 change.

15 There's no evidence presented today or
16 in the papers of either of those. Not one of
17 the experts testified that they know the
18 problem with the Wisconsin election
19 tabulation system or equipment. In fact,
20 every one of them confirmed the opposite.

21 Mr. Mebane, of course, is not here.
22 What we heard from is Professor Stark, an
23 expert who did not do the study, who couldn't
24 even answer the Court's questions about the
25 information -- the data that went in the

1 study. And Professor Mebane concludes that
2 you can't say that it was the result of any
3 problem.

4 All that we have here is 100 percent
5 hypothetical speculation about what could
6 possibly, imaginably happen. That is far,
7 far short of any standard. It's not clear
8 and convincing evidence. And this decision
9 is not a probability. This isn't a motion to
10 dismiss type of situation or a motion to
11 dismiss on the pleadings. This is clear and
12 convincing evidence, and we are not in the
13 ballpark of that.

14 The separate independent, excuse me,
15 branch that must be met is that the mistake
16 produces a substantial probability that the
17 result will change. There's been no evidence
18 about that whatsoever. And with not great
19 surprise the petitioner, Jill Stein, has said
20 publicly that she does not think there's a
21 likelihood of that, and her campaign manager
22 said that that is not why this lawsuit was
23 filed.

24 We're left with, frankly, your Honor,
25 not a close case. The statute presumes the

1 system that is in effect. It gives local
2 canvassers the discretion for them to choose
3 the best way how to conduct this recount
4 absent clear and convincing evidence, and we
5 have not -- we are not -- the petitioner's
6 not anywhere near that standard.

7 THE COURT: Thank you. Any final
8 words from petitioner?

9 MR. BRINCKERHOFF: No, your Honor.

10 THE COURT: Thank you. I'm going to
11 take a break and then I'm going to come back
12 and then I'm going to announce my decision,
13 because I think it's important to deal with
14 this tonight --

15 MR. MURPHY: Thank you.

16 THE COURT: -- for everyone. I want
17 to say before I take the break, I'm very
18 impressed with your abilities, your
19 preparedness to a very quick situation, your
20 professionalism. This has been an amazing
21 display of excellent lawyering. However, my
22 decision is -- and I haven't made it yet --
23 comes out, I want to thank all of you for
24 your time and effort tonight, and we'll go
25 from there. So I will try to come back as

1 quickly as I can. Thank you.

2 MS. GREENBERGER: Thank you, your
3 Honor.

4 MR. BRINCKERHOFF: Thank you.

5 (A short break is taken.)

6 BAILIFF: All raise for the Court.

7 THE COURT: Thank you. Please be
8 seated.

9 Thank you.

10 As I indicated before we started, I
11 had read everything. I read all the
12 affidavits, all the supporting detail, the
13 briefs, and I appreciate the arguments of
14 counsel and the witnesses.

15 What I want to say first is the people
16 of Wisconsin have an absolute right to rely
17 on the integrity of the voting process. The
18 right to vote is the cornerstone of our
19 democracy. A recount isn't a threat.
20 Instead, it should be an affirmation of the
21 democratic process. And I think we can all
22 agree that a hand recount is the gold
23 standard. It's the best we can do, and I
24 don't think there's any dispute to that.

25 We also can probably agree that there

1 is no cost difference between a hand recount
2 and recount as proposed by the various
3 canvassing or the various counties because of
4 the fact that the petitioner is going to pay
5 for it.

6 And I also recognize that Dane County
7 has affirmatively agreed to hand count the
8 ballots. It is the second largest county in
9 the state. And that is best way to determine
10 the recount.

11 However, having said that, that's not
12 the court's decision to decide what's the
13 best way. That's not what I can do.

14 When I took this job -- I follow the
15 law. That's who I am despite my personal
16 opinions or what I feel is the best count. I
17 have to do what the law tells me to do.

18 And here the law is contained in
19 5.90(2), and it's a two-prong test. The
20 petitioner bears the burden of establishing
21 by clear and convincing evidence that due to
22 a irregularity, defect, or mistake committed
23 during the voting process, the results of a
24 recount using an automatic tabulating
25 equipment will produce an incorrect recount

1 result, and -- this is second prong -- that
2 there is a substantial probability that
3 recounting the ballots by hand, or another
4 method, will produce a more correct result
5 and change the outcome of the election.

6 Based on the evidence, even if I find
7 that there is a substantial probability that
8 recounting the ballots by hand will produce a
9 more correct result, which I think is
10 undisputed, and even if I find that change
11 the outcome of the election is met here
12 because the outcome of the election is
13 ambiguous doesn't mean it switches from what
14 was originally a victory for Trump is now a
15 victory for Clinton even if that is
16 sufficient or it's just the number of votes
17 change.

18 So, even if I find the second prong
19 has been met here, I still have a problem
20 with the first prong. It's clear and
21 convincing evidence that due to a defect or
22 mistake or something else committed during
23 the voting that the results of recount using
24 the equipment will produce an incorrect
25 recount result.

1 So, what is clear and convincing?

2 The burden of proof, at least in
3 Wisconsin jury instructions, indicate that
4 clear, satisfactory, and convincing evidence
5 is evidence which when weighed against that
6 opposed it clearly has more convincing power.
7 It is evidence which satisfies and convinces
8 you that yes should be the answer because of
9 its greater weight and clear, convincing
10 power.

11 So, the testimony today has been that
12 the experts have said there is a chance that
13 the machines could have been hacked or that
14 there are other problems with the machines,
15 that they don't read correctly, all of which
16 may be true, but there's nothing to link it
17 to Wisconsin. There has to be a link to
18 committed during the voting process. There
19 hasn't been that link met here.

20 There has been the small -- there has
21 been the allegation about the small wards
22 that one of the other professors, his study,
23 but he hasn't been here today. His own study
24 indicated that he can't tell you why the
25 outcome. And it is something that an expert

1 can rely on under 907.03, but it is
2 inadmissible hearsay evidence. Though, the
3 testifying professor can rely on it in his
4 opinions, and I did take his opinions into
5 weight.

6 But all of the experts indicated that
7 yes, there are these potential issues. And I
8 understand the problem. The problem is you
9 don't know there's going to be an issue until
10 you do it.

11 But under the statute, I can't
12 speculate. I have to find by clear and
13 convincing evidence that there is some sort
14 of defect, mistake, or irregularity committed
15 during the voting process that would cause
16 the recount using the automatic tabulating
17 equipment to have incorrect recount results.
18 And I don't find by clear and convincing
19 evidence that occurred here.

20 So then we default back to 5.90(1),
21 which allows the board canvassers to
22 determine how they're going to do the
23 recount -- and the fact that they want to do
24 a recount using the machines is their
25 decision, it's their discretion. I may

1 disagree with it. I may see that the hand
2 ballots is the best way. I think we would
3 all agree with that. But I can't put myself
4 in their position.

5 I understand it is extremely important
6 to the people of the state of Wisconsin. I
7 understand that it is extremely important to
8 the Nation. But I must follow the law, and
9 the law as set forth in 5.90(2) is there for
10 a reason. And I just do not find clear and
11 convincing evidence.

12 So, that is my decision. I'm going to
13 allow the 19 counties to do the recount the
14 way that they intended.

15 Again, I think everybody would
16 strongly encourage them to do the hand
17 recount, but it is their decision, and that
18 is the -- the legislative function is to make
19 the statutes, and in this situation, I don't
20 have any authority to decide what is the best
21 for those counties.

22 So, that's my decision. Any
23 questions?

24 MR. MURPHY: No questions.

25 MR. BRINCKERHOFF: None.

1 MR. MEULER: One quick logistical. Do
2 you need a proposed order --

3 THE COURT: Yes, please.

4 MR. MEULER: -- to that effect?

5 THE COURT: Yes.

6 MR. MEULER: Okay. So just for the
7 reasons on the record.

8 THE COURT: Correct. Thank you.

9 MR. MEULER: Okay.

10 THE COURT: And again, I really
11 appreciate the time, the effort. I know how
12 important this is to everybody. And thank
13 you all for taking the time to come here to
14 argue that. So, thank you.

15 MR. MEULER: Thank you, Judge.

16 MS. GREENBERGER: Thank you, your
17 Honor.

18 (End of proceedings.)

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1 STATE OF WISCONSIN)
2 COUNTY OF DANE)SS.
)

3 I, MELANIE A. OLSEN, do hereby certify that I
4 am an Official Court Reporter assigned to report the
5 proceedings herein in Dane County, Madison, Wisconsin;
6 that the foregoing pages are a true and accurate record
7 of the proceedings held on the 29th day of November of
8 2016, before the Honorable Valerie Bailey-Rihn, Circuit
9 Court Judge, Branch 3, in my presence and reduced to
10 writing in accordance with my stenographic notes made at
11 said time and place.

12 Dated this 1st day of December 2016.

13
14 _____
15 Melanie A. Olsen
16 Court Reporter
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